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THE OPERATIVE AND RE-EDUCATIVE TREATMENT OF SPASTIC PARALYSIS.

By **N. D. Royle, M.B. (Syd.),**

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The treatment of spastic paralysis has what we might term peripheral and central aspects. The disease is characterized by hypertonicity of the muscles and disturbances of muscular balance on the one hand, on the other by inability of the patient to effect changes in the muscular state. These characteristics are present in variable degrees. In some cases there is complete loss of control of movement in the affected region, in others innervation of muscle groups is possible but is not accompanied by relaxation of the antagonists, while, in others again, changes in the state of contraction of the antagonists can be produced, but the resulting movement is performed slowly and inaccurately. The cause of the condition is that the nervous impulses which come from the cerebral cortex, are either blocked by some pathological state, or are so diminished in numbers and intensity as to be unable to affect the physiological condition of the lower motor neurones. The hypertonicity of the muscular system is an expression of the unopposed and increased activity of the lower reflex arcs, afferent impulses being reflected on to the corresponding motor neurones and giving rise to spasm or an excessive state of tonic contraction in the muscles. The seat of the reflex changes does not materially affect the problem, the presence of hypertonicity does. The stronger and, mechanically, better placed muscle groups overcome their antagonists and produce deformities such as *talipes equino-varus* of the lower limb, pronation of the forearm, flexion of the wrist and fingers. These deformities, in the uncontrolled state of the muscles, are more or less permanent, though to a less degree in acquired hemiplegia than in congenital spastic paralysis. In one case which came under observation, a wrist which had been practically subluxated from the unopposed action of the flexor muscles in spastic hemiplegia for twenty-three years could be reduced passively or electrically without great difficulty, whereas in a congenital spastic paraplegia of seven years' duration there was fixed plantar flexion and adduction of the knees. The change in the muscular state produces an intrinsic paresis in the overstretched groups, particularly in spastic paraplegia in which the quadriceps muscles may be so stretched that there is absence of the knee-jerk, in spite of the hypertonic condition of the arcs which are involved. Another noticeable change from normal physiology which makes itself apparent in the re-educative process, is the ease with which any impulses coming from the cerebral cortex are reflected through the synapses of lessened resistance, because of greater use and almost invariably produce contractions in the overacting groups.

The Aim of Treatment.

The obvious aim of treatment is to restore the patient's ability to initiate and transmit normal corticospinal impulses, or, failing this, to produce a maximum and uninterrupted effect from the fewer nerve impulses that remain at the patient's command. The latter we have usually to do. The initiation and direction of the impulse is a psycho-physical problem, the reception and the production of the maximum effect is a physiological problem. Under normal circumstances a nervous impulse producing a contraction in a muscle group leads to an inhibition in the contraction of the opposing group, and it may be directed to produce a contraction in any desired muscle group. In spastic paralysis, should the impulse reach the motor neurones, it tends to spread, in some cases producing a contraction in a large number of muscles, in others causing a simultaneous contraction in opposing groups. The condition of the spinal cord resembles that present in strychnine poisoning. The mechanism of reciprocal innervation appears to be in abeyance. To test this I tried the effect of stimulation of the dorsi-flexors of the ankle during a marked ankle clonus, and found that it was only when these muscles were approaching their complete contraction that relaxation of the plantar flexors occurred, and it did not occur at all in some of the tests.

The aim of the peripheral treatment must be to lessen the irritability of the reflex mechanism of movement and to restore muscular balance. From this point of view massage and electrical treatment, as usually practised, are not only useless, but may actually increase the condition we wish to mitigate. One of the advantages claimed for massage is its ability to increase muscle tone reflexly, though this does not apply to all procedures. Friction and stroking movements, percussion and kneading should be avoided while the clinical results of *effleurage* of exceeding light and rhythmic character warrant its use. It has been known since Lucas-Championnière demonstrated his method of treating recent fractures that relaxation of muscles follows lightest *effleurage* and physiological experiments show that it is possible to produce inhibition in a muscle group with a certain kind of stimulus, whereas a stimulus of different intensity or character travelling along the same afferent paths may produce a contraction. The indiscriminate use of electrical treatment cannot be too strongly condemned. It is hard to see what beneficial result can follow the passage through a limb of a faradic current which throws all the muscles into simultaneous contraction. The stimulation of the weaker groups has more to recommend it, but the explanation of the value of the constant current must be left to those who use it.

Splinting in the over-corrected position is of the greatest value. With the elongation of the overacting

[1] Read at a Meeting of the New South Wales Branch of the British Medical Association on November 29, 1919.

groups there is a certain amount of physiological relaxation, and fixation prevents the afferent impulses which result from muscular contraction, from arising and thus leads to a decrease in the activity of the reflex mechanism. In some cases splints have been found the only peripheral treatment necessary.

The Operative Treatment.

The operative treatment is usually directed to relieve the peripheral condition. Foerster's resection of the posterior nerve roots aims at lessening the afferent impulses, and thus decreasing the reflex discharge from the motor neurones. The operation is difficult and the mortality very high when compared with other procedures. Myectomy as practised by Sir Robert Jones for adductor spasm has a limited application. Tendon transplantation to reinforce the weaker groups, as in Tubby's operation for turning the *pronator teres* into a supinator often involves great technical and greater re-educative difficulty. Re-education is not the simple process that it is often imagined to be, except in the transplantation of muscles of associated function; in the case of muscles of antagonistic function the process is full of psycho-physical difficulties, and in many cases the transplanted muscle simply acts as a ligament. The transplantation of muscles of similar function, such as the *extensor indicis* into the *extensor longus* of the thumb, cannot be applied as often in spastic paralysis as in the flaccid variety, since both muscles are involved in the paresis. The most satisfactory procedure in my experience is Stoffel's resection of the peripheral nerves. It has the advantage of being a very safe operation; in twenty-four operations I had no complications of any kind. The attack upon the disordered state is peripheral, and consists of restoring the muscular balance by partially resecting the nerve supply to any particular overacting group. Compared with other methods, it has a much wider range and more definite application. For example, the *equinus* or the *varus* deformities of the foot may be dealt with either separately or together by resecting different parts of the tibial nerve. In the upper limb treatment may be directed to overcome pronation, flexion of the wrist, fingers or thumb. Adductor spasm may be dealt with by resecting the obturator nerve, flexion of the knee by attacking the nerve to the hamstrings.

As regards the method of resection I prefer to do this close to the entry of the nerve into the muscle group. The parent trunk is exposed, the nerves are secured and followed by blunt dissection to their destination. If there is any doubt about the distribution of a particular division stimulation with a weak faradic current may be of use, though in most cases I prefer to work without it. The danger of regeneration is met by exsecting as long a section as possible and by turning the proximal end backwards and insinuating it beneath the perineurium. The dosage may be regulated by resecting one-third, one-half or more, according to the disturbance of the neuro-muscular state. There is a distinct danger of doing considerable and irreparable damage if anatomical accuracy is not observed, as, for example, the production of *talipes calcaneus*, by removing the whole nerve supply of the gastrocnemius. In two of the earlier cases which were treated by this method the operation had to be repeated on account of insufficient resection.

In this series of eighteen cases some part of the median was resected in eleven cases, the obturator was completely divided within the pelvis in four, some part of the tibial was treated in fifteen instances and the nerves to the hamstrings were partially divided in two cases. There were four cases of spastic hemiplegia, three of which were due to gunshot wounds of the cerebral cortex and one due to cerebral hemianæmia from involvement of the vessels of the right side of the neck. Spastic congenital paraplegia was represented by six cases, in one of which the disease involved all four limbs, as well as the muscles of the face and tongue. There were eight cases of hemiplegia in children.

The Results of Resection.

The results are very satisfactory particularly in the *equinus* and *equino-varus* deformities of hemiplegia. Even in the cerebral hemianæmia the patient was able within a few weeks to discard a splint which he had worn for some years, and has now learned to dorsiflex with slight abduction of his foot. In the upper limb the results have not been as uniformly striking, but this might be expected from the more intricate function and from the greater dependence upon intellectual guidance. In spastic paraplegia adductor spasm ceased to interfere with the movements in every instance. This, with improvement in the contracture of the knees, enabled one patient to walk after eighteen years and another to stand after seven years' duration of a congenital paralysis. In several instances I noticed that ability to plantar flex in walking was absent immediately after the operation, but in every case returned after a few weeks' exercise. The permanence of the results is an important question. There may be a recurrence of spasticity through insufficient resection. This occurred in two of the earlier cases, but since that happened I have usually removed at least one-half of the nerve supplies with consistent results. The danger from regeneration of the divided nerves is not great. Some of the operations were done over twelve months ago, and, considering the short gap between the divided ends, the results of regeneration should be apparent.

The Central Aspect of the Problem.

The educative or re-educative treatment constitutes the central aspect of the problem. It is concerned with the initiation of the nervous impulse, its direction, distribution and the recognition of its result. In the re-educative process the initiation of an impulse does not usually present great difficulties. Previous physical education has provided the patient with mental pictures of movement which he can usually recall. This recollection raises the activity of the appropriate sensory motor cortex, the resistance of the synapses is probably lowered in certain directions along which it is easy for the impulse to travel. When part of the recognized sensori-motor cortex is destroyed we presume that there are other centres over which intelligence has control and in which the reflection of the sensory impression to motor neurones may take place. The impulse may be blocked, but in most cases there is some effect produced in the muscular system. This is noted, and, if necessary, the patient's atten-

tion is directed to the result. The more common difficulties met with are, firstly, that the impulse tends to spread, and, secondly, that if the correct spinal level is reached, there is a likelihood of the resulting movement occurring in the stronger or more contracted group. This is in keeping with the known physiology of the disorder. Magnus showed on decerebrate animals that the reflex response was flexor or extensor according to the preponderance of tone in the one or other groups.

The method of limiting the spreading of the effect of the impulse is to check as far as possible any movement except the desired one. This may be done psychologically, by minimizing the patient's effort during the attainment of accuracy or by cutting out the mechanism of previous mental efforts which have produced erroneous results. The anatomical arrangements of muscles may be altered so that only the movement of a certain group is permitted.

To obtain a maximum effect from the impulse from the cortex the lower motor neurones must be prepared. Exceeding light *effleurage* may decrease the activity of the reflex mechanism. The maintenance of shortening in the contracting group, with lengthening and relaxation in the antagonists, greatly enhances the possibility of obtaining a voluntary contraction, in addition to minimizing the work of the contracting group. To obtain contractions in paretic groups, in the absence of a voluntary result, electrical stimulation may be used, and I prefer that it should be applied at the same instant in which volition occurs. The basis of re-education is to obtain a voluntary movement, to which the patient's attention is directed and the accompanying sensory impulses of which he is asked to note. This tends in some cases to re-establish his mental pictures, and in others to render them more vivid and intense. The result of this training is to render initiation of the impulse easier, the resulting impulse more accurate in its destination and stronger in its effect. The only hope we have of effecting a change in the state of a spastic muscle is to heap impulses directly into the centres controlling the antagonists. Physiologically this should lead to its inhibition, and it does so when the muscular balances have been restored. Accurate control of groups is followed by training in co-ordinations.

THE MECHANISM FOR THE REGULATION OF THE ACID-BASE EQUILIBRIUM OF THE SYSTEM AND ITS BEARING ON CLINICAL MEDICINE.[1]

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The human organism lives and moves in hostile surroundings, and much of its function is to maintain itself in equilibrium. Owing to their delicacy the essential structures of the body require a uniform environment. Claude Bernard, forty years ago, said: "All the vital mechanisms, varied as they are, have only one object, that of preserving constant the conditions of life in the internal environment." Of the constancy of the body temperature, the chemical and physical properties of the body fluids, of the evenness of the chemical and physical activities and the wonderful co-ordination of all the functions of the system we are aware, but of the mechanisms by which these things are attained our knowledge is very imperfect. Of late years, both clinically and in the laboratory, the question of the acid-base equilibrium of the blood and tissues has come to the front, and I propose this evening to discuss that subject in some of its bearings.

It has been estimated that the hydrogen-ion concentration of pure water is 1.0 gramme in ten million litres, and that the hydrogen-ion concentration of the blood is 0.4 gramme in ten million litres, hence, if water be regarded as the standard of neutrality, then blood is a slightly alkaline fluid. The human organism is very sensitive to acids, and life and function depend within quite narrow limits on the reaction of the blood and tissues, to such an extent indeed that an increase of the hydrogen-ion concentration of the blood to one gramme in ten million litres promptly causes death. Acids are being continually formed in metabolism, such as carbonic, hydrochloric, phosphoric, sulphuric, oxybutyric, oxalic and lactic acids. It is of moment, therefore, to consider how the normal reaction of the blood is maintained. The general principles of how this is done are now well understood, owing to the work of Haldane, Henderson, Barcroft, Moore, Lewis, Palmer, Van Slyke and others. Under ordinary circumstances, the introduction of base in the food, the elimination of carbon dioxide by the lungs, the excretion of acids by the kidneys and probably to a less extent by the skin, and the utilization of urea ammonia in saving base serve to keep the reaction of the blood constant.

The first line of defence is formed by the bicarbonates, chiefly sodium bicarbonate of the blood. The bicarbonate has the power to hold carbon dioxide in the proportion of one to twelve without any sensible change in reaction. This is in response to the chemical laws governing the combination of strong bases to weak acids. Recently (*Journal of Physiology*, 1917), Buckmaster has adduced strong evidence in favour of hæmoglobin being an important carrier of carbon dioxide in the blood, and Moore (*British Medical Journal*, September, 1918) holds that plasma and tissue proteins can hold acids to a certain extent without a sensible change in reaction. In these ways, some or all of them, without any strain or circulatory disturbance, a stream of acid the equivalent of several hundred cubic centimetres of pure hydrochloric acid passes out of the system every twenty-four hours. Furthermore, the respiratory centre is extremely sensitive to variations in the acid content of the blood, and any increase of carbonic acid gas, such as occurs during exercise, promptly excites the respiration to increased action, and thus leads to its elimination. Carbonic acid used to be regarded as the respiratory hormone, but Henderson declares the hydrogen-ion to be the true exciter of the respiratory centre, and, indeed, it must be so since it is the hydrogen-ion that establishes acidity in any case. One may recall here the similarity between the catalytic action of acids and that of enzymes. The bicarbonates of the blood also act as buffer salts to acids. When any acid—let us say lactic acid—is formed in metabolism and finds its way into the blood, it combines with the sodium

[1] Read at a Meeting of the New South Wales Branch of the British Medical Association on November 29, 1918.

salt to form sodium lactate, and releases carbonic acid, which can not only be easily driven off by the lungs, but is a much weaker acid than lactic, in that its electrolytic dissociation is far less. The proteins of the plasma and tissues are also said by Benjamin Moore and others to act as buffer substances to acids and alkalies, by virtue of their amphoteric character, being able to take up and hold a certain amount of acid or alkali when these are in excess in the blood.

The next important part of the mechanism is the excretion of acids by the kidney. Acids formed in metabolism immediately claim bases and form salts. Some acids, such as oxybutyric and phosphoric, are excreted in the free state, the base being returned to the blood. The most important action of the kidney in this respect, however, is its capacity to alter the ratio of the excretion of alkaline and acid phosphates. When there is the necessity of saving base in the system the acid phosphate of sodium (NaH_2PO_4) is excreted in preference to the alkaline sodium phosphate (Na_2HPO_4). It has been shown that in normal subjects the kidneys eliminate from 200 to 800 c.cm. tenth-normal acid in twenty-four hours. The base excreted as salts in the urine is replaced by base in the food.

Next is the part played by ammonia in neutralizing acids. The formula of urea is $(NH_2)_2CO$, and the system has some power of utilizing the NH_3 before it is converted into urea to neutralize acids, thus saving bicarbonate of soda and other alkalies.

Henderson sums the matter up this way: The hydrogen-ion concentration of the blood depends on the ratio—

$$\frac{H_2CO_3}{NaHCO_3}$$

If acid reduces the denominator, the respiratory centre is stimulated and the lungs reduce the numerator; further ammonia releases base and the kidneys remove a greater proportion of acid phosphate, thus returning base to the blood.

Palmer uses the following experiment to demonstrate the buffer substances in the blood: Take four beakers; in two place a few cubic centimetres of a solution of phosphates, one part of mono-sodium phosphate to five parts of dibasic phosphates (having in general the properties of carbonates in the blood), in the other beakers put some normal saline solution. Add a few drops of phenolphthalein to one of the solution of phosphates, and observe that the colour does not change, and that it is therefore acid in reaction. To the other solution of phosphates add methyl orange and note the yellow colour and alkaline reaction. To the salt solutions proceed similarly, and note the same results. Now note that, while one drop of a tenth-normal sodium hydroxide solution turns the salt solution containing phenolphthalein a deep pink, it takes several cubic centimetres to cause the solution of phosphates containing phenolphthalein even to change colour; likewise note that one drop of a tenth-normal hydrochloric acid added to the salt solution containing methyl orange produces a deep red colour, while it takes several cubic centimetres to casse the similarly changed phosphate solution to change colour. From what has been said, it is clear that the organism has many resources for maintaining the normal reaction of the tissues, and that Nature in this respect, as in others, works with a wide margin of safety.

Nevertheless, acidosis, owing either to excessive production or deficient excretion of acids, does occur. Henderson says it is as common as fever, and should be tested for clinically in pathological states. Acidosis may be defined as a depletion of the alkali reserves of the body, and especially of the bicarbonates of the blood.

Hyperpnœa is the only positive clinical symptom of acidosis, but this is a late and severe manifestation. Tests for acetone and diacetic acid may show these substances in the urine, but these bodies, while they are important, only indicate one form of acid production, namely, that from the incomplete oxidation of fats; moreover, they may recur in easily demonstrable quantities, without diminishing the bicarbonate reserves of the blood, and, further, there may be severe acidosis in their absence. An increased ratio of ammonia to urea nitrogen in the urine may indicate an acidosis, and is a useful test. The determination of concentration of bicarbonate in the blood is another way to uncover an acidosis. This may be done in three ways:—

(1) By estimating the amount of CO_2 in the alveolar air.
(2) By determining the carbon dioxide capacity of the blood by Van Slyke's method.
(3) By giving by the mouth five grammes of bicarbonate of soda and watching the effect on the urine.

Of these methods, the best for practical purposes seems to be Van Slyke's, and it is desirable that clinical laboratories should be in a position to supply Van Slyke's readings. There is a full account of his apparatus and method in Joslin's book on the treatment of diabetes published recently.

We can now consider the matter in its more practical bearings. Haldane and Priestly showed the intimate connexion between the carbon dioxide tension in the alveolar air, and therefore in the blood and respiratory activity. It became evident that this effect was due to the stimulating or sensitizing effect of carbonic acid on the respiratory centre. Then it was observed that other acids, such as lactic acid, after severe exercise, and oxybutyric acid in diabetic coma, had a stimulation effect on the respiratory centre, and now it seems to be accepted that it is the hydrogen-ion that is the chemical factor which controls in conjunction with certain peripheral nerves the respiration. The relation of the chemical and nervous factors in respiration may be stated as follows: Deflation or negative ventilation of the lungs excites inspiration, inflation or positive ventilation excites expiration, and the hydrogen-ion concentration determines the amount of response. Let us note here the extreme delicacy of the regulation. The hydrogen-ion concentration in blood is 0.4 gramme in 10,000,000 litres, that is, one part in 25,000,000,000, and yet the very slightest increase has a profound effect on the respiratory centre. But are we not impelled to ask does the action of hydrogen-ion stop with the respiratory centre? It is established that any increase of acidity in the blood has a stimulating effect on general metabolism, and one cannot see any good reason why other centres in the medulla, such as the sweat centre

and vasomotor centre, should not share in the stimulating effect of the hydrogen-ion. It may be that acid has some controlling influence on metabolism in general, and we can see this, that the stimulation of metabolism by acid would, like the stimulation of the respiratory centre, be a protective measure in acidosis, by ensuring a complete combustion of the products of metabolism and the proper elimination of acid bodies. However, that is for the future.

As already stated, hyperpnœa is the only clinical symptom of acidosis. The best-known example of this is the air hunger that occurs in diabetic coma. The condition was first described by Kussmaul, in 1868. In 1877 Walter, by introducing hydrochloric acid into the stomach of a rabbit, produced coma and hyperpnœa. He noted at the same time an increase of ammonia in the urine and a diminution of carbon dioxide in the blood. In 1883 Minowski isolated β-hydroxybutric acid from the blood of a patient with diabetic coma.

The acidosis in diabetes is due to acetone, diacetic acid and oxybutyric acid, also known as ketone bodies. The following are some of the facts known about these substances. If a normal man lives for three days on a carbohydrate-free diet his urine will react for acetone and diacetic acid. Total fasting for one or two days will also cause their appearance in the urine. Prolonged fasting does not lead to their notable increase, and in cases of diabetes fasting leads to their disappearance. Acetone and its allies occur in patients suffering from persistent vomiting. They are frequent in the first days of acute illness in children, due probably to temporary starvation. In a diabetic patient the increased consumption and combustion of carbohydrate causes a diminution or disappearance of ketone bodies. These facts make it appear that the formation of the bodies is controlled in some way by the combustion of carbohydrate in the body.

A diabetic patient may secrete large quantities; Joslin says several hundred cubic centimetres in twenty-four hours. The best treatment for acidosis in diabetes is starvation, preceded, if coma is threatened, by a vegetable diet containing 5% to 10% carbohydrates for two or three days. Theoretically, large doses of bicarbonate of soda should be of benefit, but they are rarely successful in curing diabetic coma, and Joslin is doubtful of their benefit.

In cyclic vomiting and delayed chloroform poisoning acidosis due to ketone bodies occurs, and may cause some of the symptoms of those conditions. So much for acetone and its co-bodies. It should be distinctly remembered that this covers only a small part of the field of acidosis, and that the mere presence of a reaction in the urine for acetone or diacetic acid is of itself of little importance.

In recent times many cases of hyperpnœa and acidosis occurring in infantile diarrhœa have been observed. Howland has shown that the acidosis in these cases is not due to the acetone group, and Schloss (*American Journal of Children's Diseases*, March, 1918) sets forth evidence that it is due to defective action of the kidneys. He also thinks that there is no essential difference between uræmia occurring in Bright's disease and the toxæmia of infantile diarrhœa, although in the latter the kidneys are not diseased. I have recently seen two well-marked cases of hyperpnœa in young children suffering from diarrhœa of moderate severity. Both children were taken off milk and given water and whey to drink, and put on 0.6 gramme doses of bicarbonate of soda every two hours; both patients recovered.

J. L. Whitney ("Studies in Acidosis," *Archives of Internal Medicine*, December, 1917) points out that the immediate cause of death in almost all cases is failure of the respiratory centre, and he gives a mass of evidence to show that, at the moment of death, most patients exhibit a decided acidosis. The effect of acids on the respiration is first one of stimulation and then one of paralysis. He points out that the terminal events in shock are similar to those in cases of death from other causes. In shock there is, first, a stasis of the circulation, due to a loss of tone in the peripheral veins, then, after a time, a crisis occurs, in which fluid is passed from the blood to the tissues and symptoms of respiratory paralysis appear. The suggestion is made that the flow of water from the blood to the tissues is due to increased osmotic pressure in the tissues, brought about by the retention of acids there. Whitney points out that infections increase the risk of an acidosis. Cardiac insufficiency is not a cause of acidosis, except when complicated by an infection, and in some cases just before death. In nephritis acidosis is the rule late in the illness, and is due to an increased production of acid, as well as a diminished elimination. Cases of gastric tetany (pyloric stenosis), on the other hand, show an alkaliosis told by high Van Slyke readings.

Sir Almroth Wright some years ago claimed that scurvy was brought about by an acidosis.

In infantile atrophy or marasmus Keller found an increased excretion of ammonia nitrogen in the urine, and he regarded that disease as a nutritional disorder, kept up by the over-stimulating effect of excess of acid in the system. In *The Medical Journal of Australia* I gave reasons for supporting Eric Pritchard's theory that acidosis played an important part in the production of the symptoms of rickets.

In puerperal eclampsia a high ammonia excretion has been found, and it is probable that a disturbance of the acid-base equilibrium is an important factor in the cause of that disease.

In a recent communication Drs. Lewis and Barcroft (*British Medical Journal*, June 22, 1918) suggest that the breathlessness on exertion in early cardiac cases is due to a deficiency of buffer salts in the blood.

In the *British Medical Journal* of September 7, 1918, Captains Barber and Semon attempt to show that in seborrhœic eczema a relative acidosis occurs, and is responsible to a great extent for the disorder.

In the above I have not attempted to exhaust the literature, but have indicated the main lines of modern thought on a subject which, in the near future, is sure to be well discussed.

I shall conclude with a few general remarks. The question of the value of giving alkalies in acidosis is important. At first sight it would seem that, as the alkaline reserve of the body is reduced in such cases, the administration of bicarbonate of soda could only do good. The matter is not so simple, however. In health the system has its own way of regulating the reaction of the tissues, and no doubt there is a rhythm in the mechanism of the excretion of acids,

as witness the alkaline (morning) and acid (evening) tides first spoken of by Sir William Roberts. In disease a new equilibrium, with an altered rhythm, is probably established. Acid supplies the stimulus for its own elimination, and alkalies may diminish the stimulus and upset the balance. In chronic nephritis, for instance, the night hours see a large excretion of urine brought about by the acid tide, and large doses of alkali might easily alter this and lead to the retention of salts of a harmful nature. Clinically we know that alkalies are not well tolerated in chronic Bright's disease. In acute Bright's disease, on the other hand, alkalies do good. For some time I have been treating acute nephritis in children with large doses (about 12 grammes daily) of potassium citrate, and the results have been excellent. It is plain, however, that discretion is needed in giving of alkalies.

It should be remember also that acidosis is secondary to some nutritional disturbance or error of metabolism. All the states in which acidosis occur seem to me to have one thing in common, namely, exhaustion or fatigue. In shock there is a depression of all the vital functions; in infantile diarrhœa, sooner or later, the child passes into a state of exhaustion; in diabetes there is a depression of the functions concerned in the metabolism of sugar and fats; in rickets there is a condition of chronic fatigue following on a period of hypernutrition; chronic Bright's disease is probably a state of fatigue following a prolonged period of hyperfunction, and, of course, preceding death, there is a functional and organic breakdown. Further, in fatigue or exhaustion two things inevitably occur, tending to induce acidosis, namely, incomplete combustion of the products of metabolism and a deficient excretion of acids, since the kidneys and skin share in the general depression of function. Fatigue implies a previous over-function, and is very likely a conservative effort of the organism.

The indications for treatment are to give rest, which includes the removal of the cause of the functional disturbance, and to lessen the production and aid in the elimination of acid bodies, and this includes as its most important item a restriction of diet. These indications are all understood and acted on, except the last, namely, the necessity of a restriction of diet. It is plain that in states of exhaustion there is a failure of function and a danger of the incomplete oxidation of foodstuffs and the incomplete removal of their final products. In all cases of exhaustion, acute or chronic, the diet should be restricted. In some cases, such as shock, this is so obvious that it is always done; in other cases, a loss of appetite, a repugnance for food, nausea or actual vomiting point the way to be followed or not, according to the wisdom of the nurse or doctor. Our patients are too often persuaded or forced to take food according to a routine, regardless of whether they can assimilate it or not. It is true, as pointed out by Haldane ("Organism and Environment") that oxidation in the system remains remarkably constant during rest, whether food is being taken or not, but foodstuffs, before they can be utilized, have to be built up into special forms, and this entails an effort and an expenditure of energy that an exhausted organism should be spared as far as possible. Into further details I cannot go at present, but the indications of any case will not be met unless it be remembered that, besides mental and physical rest, the patient requires rest to his organs of digestion and assimilation.

INFLUENCE OF SOME OF THE MODERN ANTISEPTICS ON THE TREATMENT OF INFECTED WOUNDS.[1]

By **H. Skipton Stacy, M.D., Ch.M. (Syd.),**
Honorary Surgeon, Sydney Hospital.

Probably most surgeons felt like myself, until several years ago, that if there was anything soundly established in the treatment of infected wounds, it was dependent drainage and the use of such antiseptics are carbolic, biniodide and perchloride of mercury, etc. Yet these ideas have received a rude setback during the present war, firstly by the partial success of the hypertonic salt pack treatment introduced by Colonel Gray, and later by the frequent instillation into the wound (in which dependent drainage was deliberately avoided) of innocuous antiseptics, such as the hypochlorites; the treatment devised and elaborated by Carrel and Dakin at Compiègne. In looking around for an antiseptic that was innocuous to the tissues and active in the presence of blood-serum they have rediscovered, so to speak, the antiseptic qualities of sodium hypochlorite and by their researches have evolved a method of application to the wound that, though capable of being improved upon, will, without doubt, serve as a sound basis for the future treatment of a good percentage of infected wounds, whether they be gunshot or otherwise acquired.

Let me here interpose that, in my opinion, for the treatment of a wound up to 12 or even 24 hours after its infliction there is nothing so expeditious and satisfactory as excision and primary suture; to excision may be added application of *spr. vini meth.* and then "B.I.P.P.," or even the spirit alone; undoubtedly the crucial point is the excision. This, in compound fractures, would include removal of a small area of bone around the fracture; in the case of penetrating gunshot wounds of the skull this is best done by excising the punctured portion entire by drilling around the opening; this is preferable to nibbling the edges with rongeurs, which may spread the infection. There are many compound fractures met with in civil practice that do well merely by excision of the wound of the soft tissues, or by treatment by an antiseptic such as iodine, yet there are occasions when one regrets not having carried out the technique in its entirely, for sepsis once established in bone is an exceedingly slow process to eradicate.

But to get proper results from the application of these modern antiseptics we must not apply them as antiseptics were formerly applied, *viz.*, an occasional irrigation of the wound, in which one may confidently assert that recovery was due to other procedures simultaneously adopted (notably, drainage and relief of tension), rather than by any virtue of the anticeptic; of course, in those cases where an infected wound was exposed to the action of gauze wet with antiseptic and frequently changed, the antiseptic played an important part.

[1] Read at a Meeting of the New South Wales Branch of the British Medical Association on November 29, 1918.

The very basis of the treatment is to abolish dependent drainage and so contrive that the wound will act as a cup in which the antiseptic may be poured and remain in contact with its walls until it is replaced by a fresh lot in two hours' time (the usual time adopted); in the case of severe infection this is reduced to one hour.

Hence, if the wound is made by the surgeon and he either encounters or fears sepsis, he will so place it that, if possible, it will be on the ventral surface of the body; this will allow the patient to lie on his back during the after treatment. Naturally, there are many occasions on which this is impossible. If made laterally, the patient will lie on the other side; if made dorsally he will lie as much as possible on the ventral surface of limb or trunk (as the case may be). But the dorsally placed wound often makes it impossible to apply the antiseptic continuously; one has to pack the wound with gauze around the tube, to retain some of the lotion. The dorsally placed incision has proved a real drawback in cases of arthroplasty of the elbow-joint for the relief of bony ankylosis following gunshot wounds. In these cases a certain amount of sepsis usually lights up again.

In sewing up, sutures will be so placed that the tube conveying the lotion comes out of the uppermost end of the wound, the lowermost part being closed. If it has not been inflicted by the surgeon, the same principles should be observed; but naturally one is frequently hampered by its location, and it may be more feasible to treat by the older methods of dependent drainage.

Best of all is excision of the wound track, with its blood clot and necrotic tissue, and, if necessary, the laying open of vascular sheaths, into which blood may have been effused; but this is only feasible if it is less than 24 hours old. After the end of this period the micro-organisms have got beyond the track into lymph spaces or even into the lymphatics. The tube used to convey the antiseptic is the ordinary red rubber tube of Carrel, with an interior diameter of 4 mm., but wounds in civilian surgery and gunshot wounds as seen at an Australian base hospital are seldom of great extent, and rarely require more than one or two tubes, having a terminal and one lateral opening. The typical Carrel tubes are not often necessary. It is well to pack moist gauze lightly around the tube at the mouth of the wound. On several occasions, when a wound was not cleaning up, I found that the greater part of the lotion was escaping outside the wound, through using a Carrel tube with multiple perforations, one or more of which were external.

Another point in technique is that if two tubes are used from the same conductor they must both be constructed in similar fashion, *i.e.*, one must not have multiple minute perforations and the other an open end, otherwise all the fluid will come out of the latter. Another flaw may be due to the fact that one section of the wound may be partly walled off from the antiseptic. It is important to protect the skin around with vaseline or lint.

The simplest dressing over the wound is a Carrel pad, large enough to envelop the limb and fastened together with safety pins, between the edges the tube or tubes emerge. The irrigator containing the lotion should be suspended 60 to 90 cm. (2 to 3 feet) above the level of the part, and at the first dressing an estimate should be made of the amount of fluid the wound will hold. This is done under the eye. The object of this is to prevent unnecessary flooding and overflow into the dressings. The subsequent instillations are done by releasing the clip on the tube from the irrigator. Once daily it is redressed and progress gauged; as the wound granulates, the quantity of lotion required becomes less. Smears for microscopic slides may be made every few days; the number of bacteria in, say, half a dozen fields is counted and averaged. (The result, if all goes well, shows a progressive diminution following a definite curve, when all factors are favourable; failure to follow this curve indicates a fault in the technique, such as the presence of a foreign body, of dead bone, etc.) But in practice this is not often necessary, because the wounds are seldom of such size as to favour secondary suture in preference to strapping. With strapping, the fact that the wound is not absolutely sterile will tend to no great harm; with suture it might. Of this one may be quite sure that if the wound does not clean up quickly under their treatment, there is one of the errors above mentioned. As the wound becomes shallower and less septic the tube may be replaced by gauze soaked in the antiseptic and changed three or four times daily.

In a wound not sterilized by antiseptic until some time after its infliction, cicatrization of the deeper layers has already taken place. In these areas of cicatrization are microbes which are encapsulated and only partially destroyed. Hence, with fresh trauma, re-infection readily takes place. Any surgeon who has had occasion to do plastic work months after the infliction of gunshot wounds, on bones and joints particularly, will readily realize the truth of this. But if it had been possible (and in a great many cases it is not feasible, owing to the rush of work) to sterilize the wound from the beginning by modern methods, cicatrization would not have taken place until sterilization was complete and absolute. Hence, secondary suture and any subsequent operations could be undertaken with much greater safety.

As to the antiseptics used by Carrel and Dakin, the first was what is commonly known as eusol, but afterwards abandoned for an improvement introduced by Daufresne, and commonly known under the name of "Dakin's solution." Their objections to eusol were (1) that, every time the quantity of boric acid used to arrive at non-colouration, in the phenol-phthalein test exceeds four grammes per litre, the solution became unstable and caused pain; (2) that, even when prepared with boric acid in correct quantity, it kept badly.

The points in the preparation of Dakin's solution are: (1) Titration of the chloride of lime; its chlorine content is notoriously variable. At No. 4 Australian General Hospital Lieutenant Hancock has found it to vary from 20% to 35%. He finds that packing it in jars of 7 lbs. is beneficial, since frequent removal of the lid off large jars leads to a marked diminution of chlorine. Most samples contain about 20%; the quantities usually used then to make ten litres are: Of chloride of lime, 230 grms.; carbonate of soda (anhydrous), 115 grms.; bicarbonate of soda, 96

grms.; pot. permang., 50 mgrs. (2) About every five days the hypochlorite solution is titrated (after adding a solution of pot. iod. and then HCl.), with a decinormal solution of sodium hyposulphite up to decolouration. All workers emphasize the importance of having the strength betwen 0.45% and 0.5% of sodium hypochlorite.

The precursor of these hypochlorite solutions is *liq. sodæ chlorinatæ* or Labarraque's solution, known for over a century; but its great disadvantage is its variable quantity of hypochlorite and the presence of free caustic soda.

In eusol and Dakin's solution properly made there should be no free caustic alkali, but made without proper care it is sometimes present and causes hæmorrhage through its action on the vessels; if magnesium hypochlorite is substituted the hæmorrhage ceases. Twice or thrice I have had this experience.

From a personal experience of some hundreds of cases and a view of the wonderful work done at Compiègne Hospital by Carrel and his assistants, I have great faith in the treatment by Dakin's solution; as to whether the same results can be got by eusol I am unable to speak from extended experience, but others claim to have done so. It is a little more simple of preparation.

It must be remembered that, where such inflammatory complications as cellulitis, lymphangitis, etc., are present, old friends, such as foments and incisions for relief of tension, must not be discarded, and although it is quite possible to sterilize a small abscess by the Carrel-Dakin method, yet in practice it is often simpler and quicker to adopt the old treatment of dependent drainage. As in most things, judgement is required. I should like to mention several types of cases in which older methods have been rather slow to cure, and the Carrel-Dakin method comparatively rapid.

(*a*) Occasionally, after a gall-stone operation, particularly on the common duct, one is compelled to pack gauze down to the line of incision in the duct, to shut off the general peritoneal cavity; after the removal of the gauze in seven or eight days one has a sinus which discharges pus freely. This type of wound has proved excellent to treat by the Carrel-Dakin method, in that there is no dependent drainage. By ordinary methods it is slow for the very same reason.

(*b*) Chronic empyema. A case of this, after removal of portions of several ribs and suitable placing of several Carrel tubes, with the patient lying on the opposite side, healed entirely in six weeks. The patient found the last couple of weeks in bed trying, because he was so well; but the cure would have been much delayed if it had not been for insistence on the position. And so it is with most wounds that do well under this method. It may entail a little more trouble to the nurses and a little more inconvenience to the patients from the posture; but the result is well worth it. They are well in a fraction of the time, instead of dragging on with a sinus that may not give much trouble, but that will not heal.

As to bone necrosis cases, if the sequestrum is already separated and ready for removal, subsequent frequent instillation of the Dakin's solution will quickly convert a purulent discharge into a serous one, and nothing further than a covering sterile dressing will be necessary; but if the necrosis is not yet defined, I consider that operation is not indicated and that Carrel-Dakin treatment is waste of time. This view is not in accord with the experience at Compiègne, for Carrel and Dehelly record that the method is as fully applicable to all stages, and present figures which certainly seem to prove it. Perhaps my failures have been due to faults in the technique.

For the oral sepsis after the partial removal of the tongue it is excellent as a mouth wash applied every hour; but it is only in cases like that, when the patient is very ill, that one would order it; it has a villainous taste.

As to other modern antiseptics of which I have had some, though not a great experience:—

Chloramines.—Dakin believes that the bactericidal action of the hypochlorites takes place by means of substances formed at the expense of proteins and containing chlorine in combination with nitrogen. Experiment showed that when proteins, such as blood serum, casein, white of egg, etc., were treated by hypochlorites they gave rise to products of high antiseptic potency. These substances are formed *in situ* when wounds are treated by hypochlorites. Thus, after the disappearance of free hypochlorite, there still remains in the wound a substance having antiseptic power. And so soluble salts of some of the aromatic chloramines were given a clinical trial. One of the best of these is chloramine T. This substance possesses a very high antiseptic potency, is but slightly irritating and can be used in a much higher degree of concentration than the hypochlorites; the strengths used vary from 0.2% to 2%.

On infected wounds chloramines give results similar to those of hypochlorite of soda. Used with the same technique, they sterilize wounds; if used at a strength of 1% cicatrization of the wound is not retarded. Chloramine-T has many advantages; it does not coagulate protein; it is very soluble in water and is very stable; it decomposes inappreciably if exposed to daylight and heat. As compared with the hypochlorite, it is deficient in dissolving necrosed tissues; it should, therefore, be reserved for wounds whose surface is already cleansed. Dakin's solution and eusol are decomposed in the presence of blood. Chloramine-T has not this disadvantage. For this reason I have used it for the first 24 hours after an operation in a septic case, but have then reverted to Dakin's solution, in which I have a confidence born of longer experience.

Di-chloramine-T in oil is also shown by laboratory experiments to be a very powerful and very rapid antiseptic. Sweet, from one of the American hospitals in France, has also praised it very highly for its clinical action. It is certainly simple of application; it is sprayed into the wound once daily.

In one wound which was under direct observation of the eye, I found it have no effect; it quickly healed under Dakin's solution, so I have given it no further trial.

Flavine (now called acri-flavine), in marked contrast to the older antiseptics (carbolic acid excepted), is enhanced in the presence of serum; its first action

is to inhibit proliferation of bacteria, and hence has been recommended by Hull as a good first-aid application, with a view to subsequent excision of the track of the wound at a casualty clearing station. The maximum bactericidal action of the flavine compounds is developed comparatively slowly, whereas mercuric perchloride, chloramine-T, and phenol all exert their maximum effect within two hours, and no significant change occurs subsequently. Serum is essential, in order that the full bactericidal activity of the flavine compounds should develope, hence, other things being equal, the most satisfactory therapeutic results are likely to be obtained from these antiseptics when the conditions of the wound dressing are so arranged that the antiseptic is acting in a serum medium. Hence it is best used in the form of gauze soaked in a solution of 1 in 1,000 (either in normal saline or hypertonic saline solution), and not changed more than twice daily. It does not interfere with phagocytosis.

I have certainly found it a very good antiseptic used in this way; but it was not appreciated by the nursing staff, owing to the fact that it stains everything with which it came in contact yellow.

Brilliant green is inactivated by serum, but far exceeds the flavines bactericidally in watery solution, is comparatively harmless to phagocytosis, as well as to the tissues locally, and is non-toxic when used by the Carrel method of two-hourly instillations in a strength of 1 in 2,000. Captain Benbow, of No. 4 Australian General Hospital, tells me he saw it used abroad, but the results were not so reliable as with Dakin's solution, and that, after a while, the tubes became blocked with the stain.

I have no personal experience of it. Hull recommends adding it to the paraffin and using the mixture for the treatment of burns.

Reviews.

THE ANALYTICAL MECHANISM OF THE EAR.

Many years have elapsed since any considerable contribution has been made to our knowledge of the sense of hearing. The book[1] which appears from the pens of Sir Thomas Wrightson and Professor Arthur Keith deals with an enquiry into the analytical mechanism of the internal ear. It contains exact physical and anatomical information of the route and method by which waves of sound in the air reach the auditory nerve. This account is based on the original researches of the authors, and presents many novel features. Sir Thomas Wrightson is an eminent mechanical engineer and an amateur musician. During more than forty years he has given time and study to the elucidation of the basis of the auditory sensation. His pleasure in music led him to seek for the foundation of the charm of harmonies. He commenced to examine the wave forms of compound tones and to note the harmonic curves from which these complex waves were built up. For this purpose he designed in 1877 an instrument with which he could produce two separate sine harmonic curves and the compound wave form arising from them. The compound wave was automatically traced in immediate contiguity to the simple harmonic curves, with which it could be readily compared. The crests and troughs of the waves of the simple tones are at equal distances, so that they are periodic, according to the rate of vibration. In the compound wave the crests and hollows are no longer equidistant. The compound waves may be of infinite variety, since the form is affected by the amplitude and the phase of the two original vibrations. Sir Thomas Wrightson observed by actual measurement of the compound curves taken with his ohmograph that, if the points at which the compound curve crossed the axis were taken into account as well as the maxima and minima of the crests and hollows, there became revealed a series of consecutive points which were repeated in definite order, corresponding to the frequency of the primary tones. In addition, it was easy to note periodic repetitions necessary for the production of the differential and summational tones of pairs of harmonic notes. Some years ago Sir Thomas Wrightson endeavoured to apply his discovery to the sense of hearing and sought the co-operation of a competent anatomist. He was successful in obtaining the assistance of Professor Arthur Keith who commenced an elaborate investigation of the human ear. This study has been completed and the collaboration of a mechanical engineer possessing exact notions as to the character of movements, with a highly distinguished morphologist has had the happy result that their joint monograph seems destined to supply to physiologists an accurate description of the transmission of the acoustic aerial waves to the basilar membrane of the organ of Corti and, maybe, to the hair cells and the auditory nerve.

The volume is divided into two parts, the first portion, consisting of four chapters, being written by Sir Thomas Wrightson, and the second part, arranged in two sections, being contributed by Dr. Keith.

The first chapter treats of harmony and recurrent impulses. Some account is given of Thomas Young's way of compounding vibration. The nature and origin of differential and summational tones is explained. In the second chapter a description is given of the ohmograph and a set of curves made with this instrument discussed. The principal features of the organ of hearing are detailed, with special attention to the attachment of the *stapes* to the *foramen ovale*. The annular membrane is of varying breadth around the *fenestra ovalis*, so that the part of the *stapes* where the membrane has least breadth forms a hinge. Moving on this hinge as a centre, the parts of the foot of the *stapes* travel a varying distance, according to their distance from the axis of motion. In connexion with the actions of the *stapedius* and *tensor tympani* muscles, it is contended that the arrangement of the muscles with the ossicles becomes clear, if the ossicles have to do with the regulation of pressure in the perilymph and endolymph. The two elastic muscles act in opposite directions on the chain of ossicles to balance them. Contraction of the *tensor tympani* plunges the *stapes* deeper into the *foramen ovale* and increases the pressure in the inner ear. Contraction of the *stapedius* has the opposite effect.

The third chapter is devoted to the calibration of the cochlea and to the study of the manner in which the impulses of the aerial acoustic waves are transmitted to the organ of Corti. It is pointed out that the pressure wave corresponding to the usual wave form of a sound lies one-quarter of a wave-length in front of the wave of rarefaction and compression. On that account the usual presentation of the movements of the tympanic membrane, the ossicles and the *stapes* in accordance with a wave of sound is incorrect. The *stapes* is moved forward and the perilymph is under pressure during the first two phases of the conventional wave and the *stapes* is moved back from the *foramen* and the pressure is diminished during the last two phases. The movements of the tympanic membrane become converted into piston-like motions of the *stapes*, in which the range of movement is lessened but the pressure is increased. As the fluids in the inner ear are incompressible and contained in a rigid cavity of bone, the fluid is moved to and fro with the motions of the *stapes*. The *foramen rotundum* moves to and fro to permit these translocations. It is shown with mechanical precision that, in the passage of a simple wave, a stoppage of motion or cessation of momentum in the whole volume of liquid in the cochlea takes place at the crossing-points, as well as the crests and troughs of the air wave. Four stoppages thus occur during the passage of each wave. The movements of the perilymph in the *scala vestibuli* are conducted to the *foramen rotundum* more readily across Reissner's membrane, the *scala media* and the basilar membrane than by the *helicotrema*. A careful mathematical exposition serves to show how each part of the basilar membrane moves

[1] An Enquiry into the Analytical Mechanism of the Internal Ear, by Sir Thomas Wrightson, Bart., M.I.C.E., with an Appendix on the Anatomy of the Parts Concerned by Arthur Keith, M.D., F.R.S.; 1918. London: Macmillan & Co., Ltd.; Sydney: Angus & Robertson, Ltd.; 8vo., pp. 254, with nine plates; illustrated. Price, 15s.

with the motions of the *stapes*. In respect to the basilar membrane it appears that the membrane is depressed with each inward motion of the *stapes*. The basilar membrane is stronger at its inner than its outer side, so that the maximal depression takes place at the junction of the inner third and outer two-thirds of the membrane. The arch of the organ of Corti with the hair cells on either side is displaced laterally with the depression of the basilar membrane. In this way the piston-like motions of the *stapes* become converted into transverse movements of the organ of Corti. These movements correspond exactly in periodicity with the motions of the *stapes*. Hardesty has recently shown that the tectorial membrane lies immediately above the organ of Corti and the hairs of the sensory cells are imbedded in the membrane. Each transverse movement of the organ of Corti thus gives rise to a definite flexion or extension of the cilium of each hair cell.

In the fourth chapter some discussion is given about the theory of resonance advanced by Helmholtz to explain the action of the cochlea. Stress is laid on the difficulty experienced by anatomists in finding any set of structures occurring in sufficient numbers to act as a series of resonators. The author supplies a theory based on the mechanical movement of the parts of the inner ear, whereby four stimuli are applied to each hair cell during the passage of a wave of sound. In this way the auditory nerve is stimulated periodically, in accordance with the points marked on the axis of the record of a wave in the author's instrument. Such a theory extends the physical basis of harmony to the periodic stimulation of the auditory nerve. The recognition of the tones involved in an harmonic sound thus becomes a cerebral act. Whatever view may be held as to Wrightson's theory, physiologists lie under a deep debt for the masterly description of the transmission of the movements of the tympanic membrane to the basilar membrane and the organ of Corti.

Professor Keith contributes an historical account of our knowledge of the inner ear as an introduction to his exact description of the structure, macroscopic and microscopic. This description is written in a lucid style, and will be read with pleasure by most medical practitioners. Along with his description he explains the functions and behaviour of the various parts. He points out how Sir Thomas Wrightson has made clear a number of obscure points and how his explanation may render it possible to grant hearing to some of the deaf.

This masterly work can be recommended with confidence to all interested in the structure and functions of the human body. Those possessed of little knowledge of physics are recommended to read Professor Keith's section first.

THE RATTAN COMMISSION.

In our issue of December 28, 1918, page 531-2, we published the text of a report issued by the Royal Commissioner appointed to enquire into two specific questions connected with the registration in Tasmania as a legally qualified medical practitioner of Victor Richard Rattan. In the course of his report, Mr. Justice Ewing set out that he had transmitted a cablegram to the Attorney-General of Illinois, to the following effect:—

> Please ascertain through State Law Department whether Harvey Medical College, Chicago, existed on March 8, 1907, and was its Charter on that date in existence, and whether Victor Richard Rattan became a doctor of medicine of that College. Cable reply for my information as Royal Commissioner holding an enquiry. Name cost and Attorney-General here will cable it.
>
> EWING, Judge,
> Supreme Court, Hobart,
> Tasmania.

The following letter in reply has been received:—

> State of Illinois,
> Law Department, Springfield,
> November 19, 1918.
>
> Dear Sir,—I have your cablegram of the 18th inst., inquiring as to whether or not the Harvey Medical College of Chicago, Illinois, was incorporated and in existence on the 8th March, 1907; also whether or not one Victor Richard Rattan is authorized to practise medicine.
>
> I have taken the liberty of referring said cablegram to Dr. C. St. Clair Drake, Director of Public Health of Illinois, Springfield, Illinois, with a request that he furnish you the above information direct.
>
> Yours very truly,
> EDWARD J. BRUNDAGE,
> Attorney-General.

Later a second letter, dated November 29, 1918, was received:—

> Dear Sir,—Answering your cablegram of the 18th inst., permit me to say that the Harvey Medical College of Chicago was incorporated under the laws of the State of Illinois on August 14, 1894, and is now a corporation in good standing in this State, as shown by the records of the Secretary of State's office. The records of the Department of Registration and Education of Illinois fail to show a licensed physician by the name of Victor Richard Rattan.
>
> Very truly yours,
> EDWARD J. BRUNDAGE,
> Attorney-General.

The following letters have been received by Dr. R. G. Scott, President of the Medical Council of Tasmania, from Dr. N. P. Colwell, Secretary of the Council on Medical Education of the American Medical Association:—

> December 4, 1918.
>
> Your cablegram of December 3 has been received, and I wired the following reply: "Rattan not student graduate either Jenner Harvey according official lists. Letter." We have again carefully gone through the file of official publications of both Harvey and Jenner Colleges, which are in our possession, and fail to find either a student or graduate named "Rattan." Furthermore, I got into touch with Dr. H. E. Santee, who was Dean of the Harvey Medical College up to 1905, when it went out of business. Dr. Santee has access to the original files of that school, and after a thorough search stated that he failed to find the name of any such individual as "Rattan." Our records from the Jenner Medical College are complete for several years following 1907, and contain no reference to "Rattan" either as a student or graduate. There is, therefore, no basis for issuing a special diploma to him, either by the Harvey or Jenner Colleges. Had he been listed as a student in either institutions but had failed to pass, then a special diploma might have been issued to him after he had completed certain essential work, but there is no such basis for such an assertion, since he was not listed as a student in either institution.
>
> December 11, 1918.
>
> Your cablegram of December 7 was duly received, and the following reply cabled: No Harvey College whatever existed Chicago, March, 1907. The Harvey Medical College went out of business in 1905, when its classes were transferred to the Jenner Medical College, and, as written you in my letter of December 4, the records of the institution do not show that a single individual has since been graduated. If by chance a diploma was issued at that time it was not recorded. Here, again, as stated in my letter of December 4, there would be no reason for issuing a diploma after the school had closed, unless, perchance, to render justice to some student who had completed his course of study, or nearly so, and who afterwards was able to make up certain minor deficiencies. This would not apply to anyone named "Rattan," since, as written you in my last letter, no such individual is named as a student in the official records, either of the Harvey Medical College or the Jenner Medical College.

We propose to comment on these letters at a later date.

We note with regret that through a printing error the initials B.M.A., indicating membership of the British Medical Association, were not appended to the name of Dr. Norman Dowling, on page 124, in connexion with his appointment as Medical Officer in charge of the Lock Hospital at the Gaol at Young, New South Wales.

We regret to record the death, from influenza, of Dr. Elizabeth Mary Sweet, of Brunswick, Victoria.

The Medical Journal of Australia.

SATURDAY, FEBRUARY 8, 1919.

A Biological Law.

It has long been recognized in biology that all living things breed true. The transmission of acquired characters from one generation to another has been denied strenuously by the followers of the Darwinian school. Recently we reviewed the salient points of an investigation conducted by Dr. Charles R. Stockard on the effect of alcoholism in the parents on guinea-pigs. The results of these ingenious and illuminating experiments indicate that a biological effect can in certain circumstances be produced in the race. There can, however, be little question that such an alteration in a race can only be produced by means of a direct chemical action on the sperm and germ cells, and even if this instance of the hereditary transmission of an acquired character be accepted, it must be held, until evidence to the contrary be adduced, that the atavistic tendency will lead to the loss of the acquired character within a few generations. How evolutionary changes act we do not know.

Bacteriologists and botanists have within recent years endeavoured to demonstrate a process named by them mutation. In spite of considerable expenditure of thought and energy, these workers have failed to present facts that do more than illustrate the effect of environment on the individuals. The changes produced in every case disappeared as soon as the original environment was restored. It is therefore permissible to assume that all living things breed true, and that acquired characteristics are rarely, if ever, transmitted. If a character should be transmitted in this way, it is soon lost in successive generations. This doctrine has a very important significance in regard to bacteria. It is freely held that a bacterium is possessed of a varying virulence. The virulence of a bacterium is a distinctive character, and, given an unchanged environment, it is a fixed quantity. Every bacterium must breed true. There is no foundation for the assumption of an attenuation or an increase of virulence of a bacterium, any more than there is a foundation for the assumption that the colour of a flower, or the tallness of a man can be influenced and the change maintained in a race. The assumption that the virulence of a bacterium can be increased is based on the observation that its passage through a series of susceptible animals results in a strain of enhanced virulence. This assumption is not justified. It is well known that in any culture of one class of bacteria, the individuals are usually derived from numerous sources and represent varying strains. The same occurs in Nature in connexion with all living things. In every race there are families possessiong certain qualities in varying degree, and as long as the race includes these families, there will be variations of these qualities. In the case of living beings with sexual apparatus, qualities may be introduced into a strain by hybridization or crossing. In asexual vegetable life, the absorption of a new quality through mating is an impossibility. A culture of bacteria, said to be pure, contains individuals that are practically avirulent, individuals that are highly virulent and individuals that represent countless grades of virulence between the two extremes. Passage through a susceptible animal means that the virulent, easily established organisms thrive readily, while the less stable bacteria of low virulence are crowded out. If the process be repeated, the more virulent organisms survive at the expense of the less virulent, and the resulting strain appears as a more virulent one. Similarly, attenuation is attained by producing conditions that are unfavourable to the growth and the perpetuation of the pathogenic individuals. In these environments the more saprophytic organism, whose virulence is low, finds a better opportunity of further existence. The result is a culture of bacteria with small virulence.

In an epidemic the causal organism may be of a mixed variety. The infections may be severe or mild, according to the resistance of the individuals affected; they may be severe or mild, according to the virulence of the bacteria that chance to produce the disease. On the other hand, it must be admitted that the course of an epidemic is governed by the persistence of one type, at the expense of another. In some cases the mortality of an outbreak increases as the spread takes place and diminishes as the incidence becomes infrequent. This is well exemplified in the case of cerebro-spinal meningitis within the Commonwealth.

At the acme of the outbreak the mortality was approximately 50%. The mortality fell first in Victoria, and subsequently in other States during the second half of last year, although, as shown in the table published last week, the mortality during the third quarter in the whole of Australia was still 50%. At times an epidemic may be introduced into an isolated region or continent, such as Australia, without any variety of the infecting organisms. No more interesting instance of this has yet been recorded than the outbreak of variola in New South Wales in 1913. That the organisms were of low virulence at the outset was evident, for all the cases were mild. Since there were no individuals of high virulence, even the passage through susceptible animals failed to produce a severe type of disease. It remained and eventually died out as a mild disease, having bred true during a large number of generations. Another very striking example of a disease caused exclusively by organisms of a low virulence is scarlatina in Western Australia. During a period of 21 months, up to September 30, 1918, there were no less than 943 cases, but the mortality was as low as 0.53%. Unless fresh organisms are imported into Western Australia, this disease will continue to be an exceptionally mild one.

INFLUENZA IN AMERICAN CAMPS.

A second outbreak of the pandemic of influenza which had swept over the United States of America in the spring of 1918, reappeared with greatly intensified violence in September and October. Within one month of its recognition it had been reported from nearly every quarter of the United States, civil and military. Major G. A. Soper has published,[1] by permission of the Surgeon-General of the United States Army, the results of the official notifications of the disease among the troops in America. During the period from September 12, 1918, to October 18, 1918, inclusive, there were 274,745 cases of influenza reported among the troops in camp in the United States. During the same period there were 46,286 cases of pneumonia, and 14,616 deaths. The greatest number of victims was claimed during the week ending October 11, in which one-third of all the cases of influenza and pneumonia and two-fifths of the deaths occurred.

The first report came from Camp Devens, Mass.. The epidemic in this camp is supposed to have commenced on September 7, on which date a soldier, supposed to have meningitis, was sent to hospital. By September 16 thirty-seven cases had occurred, all in the company from which the first patient came. Three days later the number of cases was 3,282. On September 20 and 21 there were 2,722 cases. In the next eight days there were 3,141 cases. Only 571 cases, all with pneumonia, occurred during the following nineteen days. It thus appears that the epidemic occupied 36 days, of which the rise covered eight days, the peak two days, the rapid decline eight days and the slow decline 19 days. Altogether, there were 9,717 patients, of whom 2,324 had pneumonia and 667 died. Half the deaths and more than three-quarters of the cases of pneumonia occurred during the period of rapid decline. The remaining camps were attacked within a short time, so that 38 camps had been attacked by October 11, 1918.

Some very interesting figures show that the first outbreak of the epidemic was most severe. In five camps attacked between September 12 and 18 there were 45,789 cases of influenza, 20.6% of the persons in camp being attacked. The percentage of cases of pneumonia among the persons suffering from influenza was 16.7, while the percentage of deaths among the persons suffering from pneumonia was 37.3. In five camps attacked between September 29 and October 1, 1918, there were 32,932 cases, 21.8% of those in camp being affected. The percentage of cases of pneumonia among the persons suffering from influenza was 20.7, and the percentage of deaths among those suffering from pneumonia was 33.6. In five camps attacked between October 3 and 11, 1918, there were 17,307 cases, 22.8% of the persons in camp being attacked. The percentage of cases of pneumonia among the persons suffering from influenza was 7.1, while the percentage of deaths among the persons suffering from pneumonia was 17.8. It would seem that, as the pandemic progressed, the proportion of soldiers attacked increased, and that the fraction developing pneumonia increased but later diminished, while the fatality of the pneumonia became less. Major Soper is careful to point out that these returns are not yet complete, and that some of the inferences drawn from them may be revised when the returns are completed for those camps in which the epidemic was not exhausted on October 18, 1918.

From the daily telegrams and other sources of information, Major Soper has ventured to make certain deductions on the characteristics of the pandemic. The outbreaks occurred suddenly, no example of slow and insidious onset being noted. The consternation and alarm of its startling presence frequently led to irrational and futile measures to check it. The highest number of cases reported for any day was reached usually on the tenth day. The epidemics subsided almost as rapidly as they arose. Within 16 to 20 days the number of new cases was 200 or less. In its epidemic aspect as in the individual case, the disease was characterized by sudden onset, great intensity and speedy recovery. Within a week of the outbreak there was an ominous prevalence of pneumonia. The time of greatest incidence of pneumonia was seven days after the greatest incidence of influenza.

In theory and practice influenza is preventible, but no large camp escaped the epidemic. No measure, except isolation, limited the pandemic. By strict quarantine the disease was, on more than one occasion, confined to certain wards of hospitals to the exclusion of others. The rapidity of spread was ascribed to great infectivity, to the short period of incubation, to missed cases and to the absence of time for precautionary measures.

[1] *Science*, Vol. XLVIII., p. 451, November 8, 1918.

Some attempt has been made to compare this epidemic with earlier outbreaks, but it is impossible to measure the severity of the earlier epidemics. The statistical data concerning them are meagre and imperfect, the figures being obtained by methods which are quite unsuitable for the purpose. Estimates based on opinions replace the counting of numbers. It is stated that, in 1889-90, 25% of the population of London, 39% of that of Massachussets, 33% of that of Antwerp, and 50% of that of Paris were affected. The Registrar-General showed that the mortality in England and Wales due to influenza in 1890 was reported as 4.523 per 1,000 persons.

Some consideration is given to the question of a recurrence of the pandemic. It is held by some that pandemic influenza will disappear as rapidly as it came, while others assert that its extinction will be gradual, being postponed for months. Those pandemics which have swept over the earth at long intervals, have exhibited recurring waves of greater or less degree. If this rule holds, Major Soper points out that America must expect another outburst of the disease before many months. Already there have been epidemics in the spring and the fall of the year 1918.

THE FATE OF QUININE IN THE BODY.

Ever since it has been known that quinine acts specifically in malaria, endeavours have been made to ascertain the best method of exhibiting the drug. It has been shown that the parasite of simple benign tertian fever is killed when immersed *in vitro* in a solution of 1 part of quinine in 5,000 parts of solvent. Many authorities have regarded this fact as a determining one in the treatment of the disease, and we have urged on several occasions that the obvious deduction is that efficient treatment must depend on obtaining at least this concentration of quinine in the blood of the patient. If the investigations of W. Ramsden, I. J. Lipkin and E. Whitley[1] are confirmed, it will be necessary for us to revise our attitude. They maintain that it is impossible to obtain a concentration of quinine in the blood sufficiently high to guarantee a complete destruction of all the parasites. The three investigators, working in the Department of Bio-Chemistry of the University of Liverpool, have devised a very delicate method or rather series of methods, for detecting very minute quantities of quinine in the various organs and tissues of the body. Utilizing the ammonium sulphate method with a final estimation of the alkaloid by Tanret's nephelometric test, they were able to recover at least 95% of the quinine that had been added to pieces of spleen, kidney, suprarenal gland and muscle. The quantities employed in these tests were about 0.05 mgrs.. On the other hand the method yielded a loss of from 13% to 23% in the case of liver and from 30% to 50% in the case of brain. The error in the case of brain was found to be due to the failure to extract the whole of the alkaloid by boiling in a saturated solution of ammonium sulphate, and satisfactory results were obtained by alcohol extraction. They claim accuracy in their analyses for quinine in blood. It is obvious that the reliability or otherwise of their findings depend on the reliability of these chemical methods. No criticism of the methods is of any value, if it is not based on an actual control of the procedures. We are therefore compelled to accept these estimations as accurate for the present. Further research revealed a highly interesting phenomenon. The authors found that no method yielded satisfactory results when quinine was added to liver. On the other hand the ammonium sulphate method proved as accurate as with spleen or kidney, when the liver was boiled before the quinine was added. They were thus forced to the conclusion that quinine is converted into some inactive substance by living or dead liver tissue. Chloroform, sodium fluoride and sodium arsenite have the power of inhibiting this conversion. The agent effecting this change is extracted in 50% alcohol and the extract can pass through a fine filter. They hold that it may transpire that this agent is an enzyme.

These observers have conducted a number of highly interesting experiments on persons who have taken quinine by the mouth or who have received quinine by intravenous or intramuscular injection. The most striking results of these carefully planned investigations are that not less than 23% and not more than 66% of the ingested alkaloid is excreted. The excretion begins within eight minutes of the medication and terminates approximately 48 hours to 7½ days after. They find that a large proportion, in some cases reaching 93% of the quinine, absorbed is metabolized in the body. In the next place they have determined that 90% of the quinine introduced into the blood stream disappears from the blood in one minute. Of the quinine found in the blood more than three-quarters is in the plasma. The adrenal glands apparently have a more marked affinity for quinine than any other organ or tissue, at all events in guinea-pigs and rabbits. The kidney comes next on the list. The concentration of quinine is found to be higher in urine than in blood and an increase in the excretion of urine is invariably accompanied by an increase in the excretion of quinine. In blackwater fever, when the kidneys functionate badly, the concentration of quinine in the urine is greatly diminished.

It still remains to be shown what becomes of the quinine that is not excreted. The authors speak of a conversion into metabolites. Some experiments with quinotoxin clearly prove that this substance is not the product of alteration in the tissues, or perhaps it would be safer to say that Pasteur's compound is not identical to the product formed in the body. There is as yet no evidence that the metabolized quinine is inert as far as its effects on malarial parasites are concerned. Nor do the authors offer any data on which they would be justified in assuming that quinine or its metabolized product disappear almost immediately from the blood. In the light of these important researches, it may be necessary to revise our conception of the action of quinine in destroying malarial parasites in the blood of ague patients.

[1] *Annals of Tropical Medicine and Parasitology*, October 31, 1918.

Abstracts from Current Medical Literature.

SURGERY.

(53) Acute Dilatation of the Stomach.

The literature of 188 recorded cases of acute dilatation of the stomach is reviewed by Doolin (*Brit. Journ. Surg.*, July, 1918). The cases are grouped in two classes: a small one, in which the condition arises independently of operation, and a large one, in which it complicates surgical procedure. Although it seems in some cases to follow a rapid lowering of the intra-abdominal pressure, yet only four cases are recorded in which the condition followed confinement, and only two after Cæsarean section. The theory most commonly accepted has been that it is due to acute primary duodenal obstruction. Post-mortem examination commonly reveals a greatly dilated stomach and a duodenum partly or completely obstructed. But which is primary? Most writers now consider the acute dilatation primary. Experimentally the condition has been produced in dogs by section of the vagi, and Payer thinks that the gastric atony following deep narcosis is a predisposing factor. French writers emphasize the importance of air swallowing, and in some cases it seems to have been precipitated by an excessive intake of food or drink. The most common symptoms are vomiting, great distension, and collapse. Thirst, dyspnœa and epigastric pain are not infrequent, and loud splashing sounds are easily elicited. According to the statistics collated by Conner in 1907 the mortality is 72%; Borchgoldink in 1913 reckoned the mortality as 54%. Of patients treated medically 93% died, by operation 72%, by lavage 50%, and of those in whom postural treatment was used only 7% were lost. Schwitzler, of Vienna, in 1895, first recommended the prone position. The patient is turned on his face, with a pillow under the pelvis and the foot of the bed raised. If this is combined with early lavage and the copious injection of saline solution the future mortality of these cases should be considerably reduced.

(54) Lingual Thyroid Tumour.

Rabinowitz (*Surg., Gynec. and Obstet.*, August, 1918) reports a case of tumour of the tongue due to an aberrant thyroid. Up to date about 70 of these cases have been described; they occur most commonly in patients between the ages of 15 and 45, that is to say, at the period of greatest physiological activity of the thyroid. In 90% of cases females are affected. The thyroid gland develops from a median *Anlage*, which is derived from the pharyngeal epithelium and two lateral *Anlagen* springing from the fourth branchial clefts. The epithelium of the median *Anlage* sinks deeper and deeper in the neck, and so becomes distant from the pharyngeal epithelium. The pedicle connecting the isthmus of the thyroid with its original site is the thyro-glossal tract, the opening of which on the tongue is the *foramen caecum*. The lingual thyroid is an embryonic remnant of this tract, and if there is an atrophy or an absence of the true thyroid gland the lingual thyroid developes in response to the body's need. The tissue of the lingual thyroid may be normal in every way, or may undergo cystic or malignant changes. It is usually situated on the dorsum of the tongue, just below and behind the *foramen caecum*, which it may enclose in its growth. It may be of any size up to that of an apple, and is nearly always encapsulated. It may project greatly above the surface of the tongue, or it may remain embedded in its substance. Its surface is covered by mucous membrane, and ulceration is very rare. There is no inflammation and no infiltration of the surrounding tissues. The surface has a darker colour than the neighbouring tissue, owing to its greater vascularity, and for the same reason profuse bleeding may follow injury or operation. There may be no symptoms of its presence, but if it is large, it may obstruct swallowing and interfere with breathing. In the differential diagnosis sarcoma has to be eliminated, a condition which is painful and rapidly growing. Carcinoma, which is usually ulcerated, indurated, and has a fœtid discharge, and lipoma, which is golden yellow, generally situated at the middle of the tongue, near the tip, and which is non-vascular, must also be eliminated. The prognosis is good, and there have been no post-operative deaths recorded in the literature, but excision may be followed by myxœdema.

(55) Anastomosis of Internal and External Carotids.

Lefévre (*Bull. et Mém. de la Soc. de Chirurgie*, May 28, 1918) points out that in wounds of the common carotid artery near its bifurcation the triple ligature, which is generally necessary, may lead to grave cerebral symptoms and death. He therefore advocates that in such cases, after ligature of the common carotid, the external and internal carotids should be anastomosed, so that the reversed flow of the blood from the distal end of the external carotid, through the internal carotid, will relieve the cerebral anæmia. He quotes the case of an English soldier on whom he performed such an operation, and who, though for some days after the operation there were paresis and paralysis on the opposite side of the body, ultimately recovered all his movements.

(56) Congenital Malformations of the Mouth.

H. Morestin (*Bull. et Mém. de la Soc. de Chirurgie*, May 28, 1918) reports a case of multiple malformation of the mouth in a female infant of eleven months. The child was backward, showed no signs of erupting teeth, and had been unable to suck. The upper lip showed a deep notch in the mid-line, involving one-third of its tissue. The tongue was bifurcated at its tip and fixed to the floor of the mouth in practically all its length. On each side of the middle line the tongue was surmounted by a whitish tumour the size of a nut. Between the lateral border of the tongue and the mandible, on each side, was another whitish mass. These tumours proved to be lipomata. The defects were repaired in a series of operations extending over seven stages, owing to the fragile condition of the infant.

(57) Partial Resection of the Lung for Abscess.

Grégoire (*Bull. et Mém. de Soc. de Chirur.*, August 6, 1918) details a case of resection of portion of the right lung for abscess following a retained bullet. Approach was gained by excision of the right eighth rib and a serous pleural effusion evacuated. A swelling was then seen on the external surface of the inferior lobe the size of a hen's egg and fluctuating. The pleura was carefully protected and the lung drawn strongly outside the thorax. A wedge-shaped area, 10 cm. to the inferior border of the lobe, was resected. Unfortunately, soiling took place from some liberated pus. The bleeding, which was moderate, was controlled by apposing the raw surface with fine catgut sutures. The lung was then returned to the thorax and the thoracic wound closed without drainage. Recovery was without incident. Grégoire points out that freedom from adhesions is a necessary condition for resection, and also that the abscess must occupy a portion of lung where resection will not compromise important structures. The collapse of the lung which follows operation, whether from pneumo-thorax or effusion, results in a diminished circulation, thus helping hæmostasis.

(58) Cranioplasty.

A report of 38 cases of cranioplasty is made by Gaudier (*Bull. et Mém. de Soc. de Chirur.*, July 31, 1918). A bone graft is obtained from the scapula through a U-shaped incision, which permits the removal of a fragment 8 cm. to 10 cm. × 6 cm. to 8 cm. A U-shaped incision also exposes the cranial defect and the pericranium is dissected back all round for 1 cm.. The graft having been trimmed to the correct size and shape (1 cm. larger than the defect) is then applied like a watch glass to its watch. Of the 38 cases, none showed suppuration or shedding of the graft. Cure was so rapid that at the end of a fortnight pressure could be borne over the graft without any symptoms.

(59) Neuroplasty.

Kenneth Mackenzie (*Surg., Gynec. and Obstet.*, October, 1918) opposes the orthodox view as to the failure of peripheral nerve flaps. He quotes three cases in disproof. In the first 27 cm. of the sciatic nerve were removed for sarcoma, and later a flap of the internal popliteal nerve 42 cm. in length was turned up and united to the sciatic nerve stump. In the second case sepsis following a gunshot wound of the sciatic resulted in the loss of 10 cm. of its length. Two flaps were turned down from the sciatic and united to the internal and external popliteal respectively. In the third case the musculo-

spiral nerve was involved in fibrous tissue in an old, ununited fracture of the humerus, complicated by a sequestrum and a sinus. A flap of 4 cm. was turned down to bridge a gap following excision of the fibrosed part. In all these cases considerable improvement, sensory, motor and trophic, took place. The writer further maintains that a peripheral nerve, when divided, should be restored immediately, whether sepsis is present or not.

GYNÆCOLOGY AND OBSTETRICS.

(60) Fibroid Tumours of the Uterus.

Edward J. Ill (*New York State Journ. of Med.*, October, 1918) gives the results of his operations for fibroids during the last 22 years, and states that they represent only a small proportion of all the cases recorded in his case books. He quotes figures proving that women rarely die from fibroids, and is therefore of the opinion that there should be a distinct indication for removal before operation is advised. The most reliable American statistics show that 27.9% of all women have fibroids, in the majority of cases uncomplicated and symptomless. He gives the following as the indication for operations. Mental depression from the knowledge of the presence of a growth. Rapid growth, diagnosed by repeated careful measurements. This is usually due to some circulatory disturbance; malignancy was never seen with sudden, rapid increase in size. The most common indication for operation in his series was pain, followed closely by hæmorrhage. He states that patients will demand relief from pain and discomfort long before they ask for relief from hæmorrhage. Pelvic incarceration, with inability to pass urine, is also an indication. Local sepsis of the tumour is given as a pressing indication, but adnexal inflammation complicating fibroids is treated medically, till the inflammation subsides. Myomectomy was performed twice for sterility, with a successful result in both cases. During the 22 years different operations were performed, but abdominal supravaginal amputation, with preservation of one or both ovaries is his operation of choice. There were 23 deaths in the series—a rate of 4.10%.

(61) Obstetric Practice in Dublin.

The clinical report of the Rotunda Hospital for the year November 1, 1916, to October 31, 1917, is published in *The Dublin Journal of Med. Sc.*, September, 1918. During the year 3,090 women in labour were attended to by the members of the hospital staff, and 277 women, who were not in labour, were discharged undelivered. Four deaths occurred in the Extern Department and seven in the Hospital. The morbidity in the Intern Department was 5.7% and the death-rate 0.3%. Of the seven deaths, two were due to hæmorrhage, one to rupture of the uterus, one to eclampsia, one to cerebral hæmorrhage, one to advanced pulmonary tuberculosis, and one to hopeless sepsis. Five cases of rupture of the uterus occurred, one in a case of ventral fixation, in which version was attempted. The routine treatment of eclampsia on the lines laid down by Tweedy continues to give good results, there being nine cases, with one death. The connexion between some of the more serious forms of accidental hæmorrhage and the toxæmias of pregnancy is mentioned. In accidental hæmorrhage the vaginal plug is considered to be most valuable, especially where the patient is not in labour. In toxæmic cases, in which the hæmorrhage is entirely or chiefly internal, abdominal section is the proper treatment. In these cases the uterus was not removed. Five labours were complicated by uterine myomata, and in three there was serious trouble. One patient died of hæmorrhage. Application of the forceps was done 70 times, and version was performed ten times. Pubiotomy was performed twice with satisfactory results as regards the mothers, but one child was still-born and a second died on the sixth day. There were fifteen cases of Cæsarean section, nine for pelvic contraction, three for rupture of the uterus, two for myomata and one for *anus vaginalis*. Scopolamine-morphine was administered as a routine during the greater part of the year.

(62) The Conservative Treatment of Eclampsia.

Ross McPherson (*New York State Journ. of Med.*, October, 1918) states that he had been brought up to consider the two words "eclampsia" and "operation" as synonymous, but seeing the good results obtained at the Rotunda Hospital by conservative treatment, he now employs this method in the treatment of eclampsia. Immediately on admission to the hospital the patient's blood pressure is taken, a catheterized specimen of urine secured and she is then put into a darkened, quiet room. She is then given hypodermically 0.03 grm. of morphine sulphate, her stomach is washed out, 60 c.cm. of castor oil are poured down the tube after the lavage, and she is given a colonic irrigation of 23 litres of 5% glucose solution. Venesection is performed if the systolic blood pressure is above 175 mm. and sufficient blood is extracted to bring the pressure down to 150 mm.; normal saline solution is not injected. The patient is then kept quiet and 0.015 grm. of morphine is injected every hour, till the respirations drop to eight per minute. Convulsions then usually cease and labour generally sets in. The patient delivers herself or forceps are applied when the head has descended into the pelvis. He gives the results of 67 cases treated in the above manner. The maternal mortality was 7.4%, the fœtal 28.5%. Practically all of the still-born children were premature or macerated. The author states that the large doses of morphine did not seem to have any effect on the viability of the child.

(63) Faradization of the Mammary Glands.

Elizabeth Sloan Chessner (*Lancet*, September 14, 1918) says that, as so many women complain that the "milk goes," in spite of faithfully carrying out the doctor's orders, she decided to try electrical stimulation of the mammary glands. At her infant centres nursing mothers are advised as to diet, and the teeth are seen to; the mother is advised to rest for 1½ hours each afternoon; the infant is fed every three hours for the first three months and every four hours after. If the baby does not gain enough weight it is given a test feeding, being weighed before and after it has had each breast for twelve minutes. If the milk is deficient in quantity the mother is ordered "lactogol" and advised to take more protein and fat. At the end of two or three weeks, if the infant's gain in weight is still unsatisfactory, "lactogol" is omitted and faradization applied. She uses hollow, cone-shaped, flexible zinc electrodes, fixed in place by an elastic bandage. The electrodes may be applied direct to the skin or underlaid with moist lint. The current is passed through the two breasts for twenty minutes twice a week. There should be a gentle tingling and no pain nor discomfort in the breasts. The results of the treatment have been most gratifying.

(64) The Prevention of Gas Pains.

Writing in opposition to dieting and purging, in other words "carefully preparing" patients before operation, L. A. Emge (*Journ. Americ. Med. Assoc.*, September 14, 1918) gives proof of the harmfulness and needlessness of "intestinal preparation" by stating that in emergency operations for conditions such as acute appendicitis or tubal pregnancy or in Cæsarean section the patients usually recover with little abdominal distress besides that occasioned by the wound. The patient "carefully prepared" for exploratory laparotomy will often suffer from distressing gas pains and distension. He quotes the results of animal experimentation by others, who have found that excised segments of intestine from purged animals show rapid muscular fatigue. He suggests that careful reports on the post-operative course in a large, unselected series of purged and unpurged patients should be compiled. A list of 100 major gynæcological operations is given, showing the incidence of gas pains. The first 50 patients were treated with liquid diet, 28 c.cm. of castor oil the evening before the operation and an enema the following morning. The next 50 were treated with ordinary diet the evening before an enema at night, and another on the following morning. In the first 50 22% had severe gas pains, 30% mild gas pains, 22% cramps and 26% no gas pains. In the second 50 patients 2% had severe gas pains, 4% mild gas pains, 28% cramps and 66% no gas pains. The operations were about the same in both series. All the patients of the second series who developed gas pains, had dense adhesions. There was no difficulty in packing off the unpurged bowel during the operation. The administration of food early after operation brings back a smoother downward peristalsis and promotes the expulsion of gas.

British Medical Association News.

SCIENTIFIC.

A meeting of the New South Wales Branch was held at the B.M.A. Building, 30-34 Elizabeth Street, Sydney, on November 29, 1918, Dr. A. A. Palmer, the President, in the chair.

Dr. N. D. Royle read a paper on "Operative and Re-Educative Treatment of Spastic Paralyses." The text of this paper will be found on page 125.

Dr. R. Gordon Craig eulogized the good work that Dr. Royle was carrying out in dealing with the spastic paralyses. He held that there was a promising future for this work. There was no more pitiable object than the victim of these paralyses, and it was sad to reflect that surgery had done so little for them in the past. Robert Jones had dealt with spastic paraplegia by a complete division of the adductors and a reduction of the *equinus* by division of the tendons. The limb was then placed in the abductor frame and fixed in plaster. The results were relatively good. The method of treatment, however, could not compare with that devised by Stoffel, which he would describe as a refined anatomical attack based on rational science. He hoped that Dr. Royle would demonstrate the cases again in the course of one or two years. Dr. Royle's modification of Stoffel's operation was excellent and certainly an improvement. He thought that the paper read brought out a potent reason for advocating high specialism in practice.

Dr. W. F. Litchfield read a paper on the "Mechanism for the Maintenance of the Acid Base Equilibrium of the System, and its Bearing on Clinical Medicine." The paper was illustrated by a test tube demonstration of the significance of buffer salts. The method of Palmer, as described in the paper was used in the demonstration (see page 127).

Dr. J. Flynn considered that the three papers read that evening were of a high order of merit. He was loath to receive Dr. Litchfield's paper in solemn silence, but he was a little timorous to say anything in criticism. It was a very practical subject. In the first place, it was necessary to keep in mind a few facts concerning the reaction of the blood. Acids and acid salts were constantly entering the blood. They were introduced into the body from without in the food; they were formed in the alimentary canal in the fermentative decomposition of saccharose matter taken in with the food or from carbohydrates, and, lastly, they were generated in the tissues of the body. Notwithstanding this constant entrance of acid into the blood of the living body, the blood remained alkaline. Great difficulty had been experienced in attempts to reduce the alkalinity of the blood. Hofmann had fed pigeons on food yielding an alkaline ash, and had found that, whatever other changes took place, the bases were not withdrawn from the alkaline blood, but were evidently withheld to maintain its alkalinity. Lascar, by introducing dilute mineral acid into the stomach of animals, reduced the alkalinity of the blood, but not to a great extent, even when he had introduced such quantities as would have rendered the whole animal acid, had it been absorbed. These experimental facts seemed to run parallel to what occurred in scurvy. This disease was brought about by the prolonged and complete withdrawal or the organic vegetable acids and their salts from the diet. These organic salts yielded on oxidation in the blood alkaline carbonates. When the alkaline carbonates were thus withdrawn, the alkaline phosphates were retained, whereas, on the resumption of an antiscorbutic diet, the alkaline phosphates were rapidly excreted.

The two salts chiefly concerned in the maintenance of the alkalinity of the blood were neutral sodium phosphate and acid sodium carbonate. The seeming paradox of an acid secretion such as urine or gastric juice from alkaline blood could be explained on the basis of the reaction between bicarbonate of soda and neutral sodium phosphate as follows:

$$NaHCO_3 + Na_2HPO_4 = Na_2CO_3 + NaH_2PO_4$$

The acid sodium phosphate thus accounted for the acid reaction of the urine. Similarly, Bence Jones had shown that the free hydrochloric acid in the gastric juice could be accounted for by the action of acid sodium carbonate on sodium chloride, as follows:—

$$NaHCO_3 + NaCl = Na_2CO_3 + HCl$$

Dr. Flynn thought that Dr. Litchfield had been in error in attributing the idea of the acid to Sir William Roberts. Bence Jones had first spoken of the acid tide in connexion with the formation of hydrochloric acid in the gastric juice.

Dr. H. Priestley said that the body had a remarkable power of maintaining a constant acid-base equilibrium. The most potent factor in the reserve alkali was bicarbonate. Protein, hæmoglobin, phosphate and other substances were of less importance. The carbonic acid and bicarbonate in the blood were maintained in a ratio of 1: 20. If the carbonic acid increased in the blood, the body made an effort to reduce it by the respiration. The kidneys were very responsive to changes in the hydrogen ion concentration. The carbonic acid content of the alveolar air was practically constant and remained in practical equilibrium with the carbonic acid content of the blood. The two were absolutely parallel.

In regard to the practical aspect of this work, Dr. Priestley pointed out that the determinations of the hydrogen ion concentration required a somewhat elaborate apparatus, and a highly trained person to carry them out. Van Slyke had suggested that the carbonic acid of the blood should be measured. A simple method for clinical purposes was the estimation of ammonia and acid to phenolphthalein in the urine. The figures obtained by these analyses were remarkably close to those obtained by the two methods mentioned above. The method was easy to apply, and contained an experimental error of about 10%. He considered that this method would be of value in connexion with diabetes. In conclusion, he complimented Dr. Litchfield on the manner in which he had handled a very difficult subject.

Dr. A. E. Mills also expressed his indebtedness to Dr. Litchfield for his valuable paper. He felt that the subject of acidosis in its chemical bearings was too intricate for him to discuss. He would, therefore, confine his remarks to clinical observations. Three days before a patient had been admitted under his care at the hospital in a comatose condition. The urine contained sugar, but no diacetic acid and no acetone. It was suggested that it was a case of diabetic coma. The absence of acetone and diacetic acid made it clear that this was not so. There were pin-point pupils, but the blood pressure was not high. He diagnosed probable localized atheroma and rupture of the vessels. At the post-mortem examination a large hæmorrhage in the pons and ventricles was discovered. In hyperpnœa there was an effort on the part of the body to get rid of carbon dioxide, and possibly of other acid and ketone bodies. While he agreed that acidosis was an important factor in certain pathological conditions, he thought that in certain cases they might be led astray if they paid too close attention to the acidosis. In some diarrhœic conditions in children, even when associated with acidosis, citrates did no good, but they got better after purging. Acidosis was but one aspect of these conditions; there were other factors of equal importance in these cases. He referred to the lamentable failure of the efforts to reduce acidosis. The introduction of sodium bicarbonate did not clear up an acidosis.

Dr. R. Gordon Craig dealt briefly with the question of the post operative appearance of acetic and diacetic acids. This appearance might lead the surgeon astray. He recalled a case in which the patient remained well for a time after an appendicectomy. He then started vomiting, and diacetic acid was found in the urine. No physical signs were detected to account for the symptoms, and it was, therefore, assumed that it was a case of delayed chloroform poisoning. Sodium bicarbonate was given, but without benefit. The patient died, and after death it was found that a knuckle of bowel had been caught in adhesions.

Dr. H. J. Ritchie considered that Dr. Litchfield had done great service in bringing up this subject for discussion. He held that the estimations by Van Slyke's method were of value in prognosis as well as in diagnosis. In America, it was held that the application of Van Slyke's determinations enabled them to make a prognosis with certainty. He thought that in the hands of more or less trained individuals the apparatus was easy to work. He referred to the possibility of an acidosis existing without any acid being present in the urine. He was surprised to hear Dr. Litchfield refer to the acidosis connected with seborrhœic eczema. This condition, in his opinion, was usually associated with an alkaline urine.

Dr. Litchfield replied briefly. He admitted to Dr. Flynn that he should have referred to the work carried out in connexion with the formation of hydrochloric acid in the gastric juice. While he was prepared to accept that fatigue might be caused by acidosis, he wished to make the point that it was often a cause of acidosis. He was interested to learn from Dr. Priestley that the determination of ammonia and acid in the urine was of practical value.

Dr. H. Skipton Stacy read a paper on "The Influence of Some of the Modern Antiseptics on the Treatment of Infected Wounds" (see page 130).

Thomas Davies, Esq., L.R.C.P. and S., Edin., L.F.P.S., Glasg., L.M., 1890, F.R.C.S., Edin., 1900, of Emerald, has been elected a member of the Queensland Branch.

Ivan Blaubaum, Esq., M.B. *et* Ch.B., New Zealand, 1915, of Wynnstay Road, Armadale, and Douglas John Thomas, Esq., M.B. *et* Ch.B., Melbourne, 1918, of Melbourne Hospital, have been elected members of the Victorian Branch.

Edward Leslie Milgrove, Esq., M.B., Ch.M. (1918, Univ. Sydney), of the Royal Alexandra Hospital for Children, Camperdown, has been nominated for election as a member of the New South Wales Branch.

At the seventh annual convention of the Public Health Services of the Province of Quebec, it was resolved that the Minister of Militia be invited to have returned soldiers examined in Europe for the existence of venereal disease, and not after they have crossed the Atlantic.

PNEUMONIC INFLUENZA.

In the *Commonwealth of Australia Gazette*, No. 17, dated February 5, 1918, His Excellency the Governor-General, acting under the powers conferred upon him by Section 12 of the *Quarantine Act, 1908-1915*, proclaimed:—

(1) That the State of South Australia is infected with a quarantinable disease, to wit, pneumonic influenza, and is a place from or through which the said quarantinable disease may be brought or carried through other parts of Australia.

(2) That such State shall be a quarantine area.

(3) That persons and goods in such quarantine area shall be subject to quarantine.

A by-law of the New South Wales Government Railways and Tramways was published in the *New South Wales Government Gazette* on January 31, 1919, to the effect that no person would be allowed to enter or remain in a railway carriage, tram-car, compartment, platform or premises of the Commissioners, unless he were wearing a face mask "sufficient to exclude the germs of contagion and so adjusted as to cover the mouth and nostrils." The penalty for any breach of the by-law was a fine not exceeding £10.

On the same day His Excellency the Governor of New South Wales published in the *Government Gazette* a proclamation ordering all racecourses in the County of Cumberland to be closed and kept closed during the outbreak of pneumonic influenza.

In the *New South Wales Government Gazette* of February 1, 1919, a proclamation of His Excellency the Governor is published, ordering all persons in that portion of New South Wales within ten miles of the border of that State and the State of Victoria to wear a mask while in any public street, vehicle, conveyance, public place or public building.

On February 3, 1919, His Excellency the Governor of New South Wales published a further proclamation in the *Government Gazette*, ordering all libraries, schools, churches, theatres, picture-shows, public billiard-rooms, public halls and places of indoor resort for public entertainment within the County of Cumberland to close and be kept closed during the outbreak of pneumonic influenza. On the same day another proclamation was published, ordering the closure until further notice of all premises licensed for the sale of liquor within the County of Cumberland. This order is "subject to the provisions of Sub-section (2) of Section 57" of the *Liquor Act, 1912*.

Two further proclamations were issued on February 5, 1919, in the *New South Wales Government Gazette*, dealing with the outbreak of pneumonic influenza. In the first it is pointed out that, as the disease had broken out in New South Wales and also in South Australia, and as all persons travelling from South Australia to New South Wales might become a source of infection to the people of New South Wales, His Excellency the Governor, with the advice of the Executive Council, ordered that no person residing in South Australia should pass into the State of New South Wales. The exceptions mentioned were (1) that a *bonâ fide* resident of New South Wales residing within ten miles of the border within the two States would be allowed to return to New South Wales, if he could prove to the satisfaction of an officer of police and a Government medical officer that during a period of seven days he had not been within any district of South Australia in which pneumonic influenza was prevalent and if he could produce a certificate from the Government Medical Officer to the effect that he was not suffering from that disease; and (2) that a person who had resided for seven days in South Australia within ten miles of the border could pass into New South Wales under the same conditions.

The second proclamation contains an order to the master or person in command or control of any vessel arriving at any port in New South Wales from any port in Victoria or South Australia not to berth or moor his vessel at any wharf, pier or jetty, but to lie at anchor in the stream until a period of four days shall have elapsed since the vessel left her last port of call. It is further ordered that no one shall land from such a vessel until the lapse of the full four days.

The Minister of Public Health of Victoria has issued in the *Victoria Government Gazette* of January 30, 1919, regulations under Sections 19, 172 and 173 of the *Health Act, 1915*, termed "Influenza Emergency Regulations."

Regulation I. determines that the regulations came into force on publication.

Regulation II. defines an infected area as an area within a radius of 15 miles from any place wherein a case of influenza has occurred and has been reported by a medical practitioner or registrar. Proper health authority includes the mayor of a city, town or borough, or the president of a shire.

3. Persons in an infected area are hereby forbidden to assemble for a common purpose (ostensible or otherwise) within any enclosed building or place, whether public or private, in numbers exceeding twenty at any one time. This provision shall not apply to persons meeting in some building dedicated to sacred use for divine worship, provided that such persons at all times during the meeting wear a mask of an approved kind, nor to persons actually employed at their profession, trade or calling assembling in the place accustomed, nor to persons resorting *bonâ fide* for the purpose of obtaining a meal to any room set apart for the consumption of food in any club, hotel, eating-house, tea-room or other like establishment. Provided, nevertheless, that the several exceptions hereinbefore expressed shall be read as conditional on the proper health authority not having in the particular case notified that the meeting of persons in excess of twenty in that particular building is prohibited, either generally or unless certain conditions are observed or requirements attended to. In the case of a general prohibition persons shall not assemble in excess of twenty; where the prohibition is conditional persons shall not assemble in excess of that number unless the conditions are observed or/and the requirements attended to.

4. In the case of an infected area (as well as in the case of places not yet coming within the definition upon the despatch of a report by any medical practitioner or Registrar of Births and Deaths of the occurrence of influenza in any district or place outside the fifteen miles radius fixed in the Influenza Regulations (Closing Places of Entertainment), 1919, made in pursuance of the obligations imposed by Section 178 of the *Health Act, 1915*), the several classes or kinds of places mentioned in the regulations aforesaid shall be closed and not used until notice permitting such use is published in the *Government Gazette*.

5. Forthwith (in the case of a theretofore clean area) upon a report being so despatched, the local municipal officials and the proper Central Government Authority in the neighbourhood cognisant of its despatch shall take

prompt steps to notify the persons controlling the places in the last clause referred to of that fact, either verbally or in writing, but the non-receipt of any such notification from an official source shall not be an excuse if the person concerned had knowledge otherwise that a report had been despatched.

6. No authority, company, firm or person controlling or running any boat or vessel (steam or other), or any railway train shall arrange for or knowingly allow any of its, their or his plant aforesaid to be used or employed in carrying persons not availing themselves of the service for business reasons or purposes not of pleasure, and no person shall use any of the services aforesaid to proceed from an infected area to a place outside, except moved thereto by some excuse considered sufficient by the tribunal having to determine the matter if such person's conduct is challenged as a breach of this regulation.

Note.—The following are the classes or kinds of places to be closed referred to in Clause 4 above:—

Schedule.—All theatres, picture theatres, music or concert halls, and all public buildings where persons assemble for the purposes of entertainment or instruction.

AN HONOUR AWARDED TO AN AUSTRALIAN PRACTITIONER.

At the moment of going to press we have learned that the French Government has conferred upon Dr. Gregory Lamb O'Neill the decoration of *Officier de l'Instruction Publique*, in recognition of his valuable services rendered to the French community in New South Wales. The intimation of the award is contained in a letter from the Consul-General of France in Australia, in the follow terms:—

February 10, 1919.

I have very much pleasure in informing you that, in recognition of the very many services you have rendered to French interests in New South Wales, the French Government has conferred upon you the decoration of *Officier de l'Instruction Publique*.

I am sending you herewith your Diploma and the insignia of the decoration.

Permit me to tender you my sincerest congratulations upon this well-merited distinction.

In offering our congratulations to Dr. O'Neill, we would wish to call attention to the fact that the award is at the same time a recognition of the medical profession in Australia and a high compliment to it.

Correspondence.

THE SURGERY OF SPASTIC PARALYSIS.

Sir,—The attention of the profession locally has lately been directed to this subject by the extremely interesting paper which Dr. Royle read recently before the New South Wales Branch of the British Medical Association. Unfortunately, the lateness of the hour and the length of the business paper on that occasion precluded the possibility of a full discussion of the points put forward by him for our consideration.

This condition is one before which the profession have in the past been too disposed to sit with the folded hands of impotence. Dr. Royle deserves our thanks for reminding us of the possibilities of surgery in ameliorating this most distressing condition. His advocacy, however, was directed to the support of Stoffel's operation, to the exclusion of other methods of surgical interference, and though many of his arguments seemed cogent, still it is only right to point out the disadvantages of the operation and the superior merits, both theoretical and practical, of other surgical procedures.

It will be agreed that the largest field for this work lies in the paralyses of childhood, the spastic hemiplegias, diplegias and monoplegias. The subjects of spastic paralyses due to cerebral hæmorrhage, thrombosis, or embolism occurring in adult life are often the possessors of such a poor expectation of life as to render operation inadvisable. It will suffice then to consider for the moment the treatment of the spastic paralyses of childhood by whatever cause produced.

Let us frankly admit that treatment is only palliative and symptomatic. The causative lesion is a cerebral one, be it hæmorrhage from rupture of a cerebral vein at birth, cyst, porencephaly, sclerosis or arrest of development of the pyramidal tract. The portions of the disability that are amenable to surgical treatment are the loss of balance between groups of antagonistic muscles, the excessive muscle rigidity present, and the deformities produced by these causes and by improper attitudes, aided by gravity. The primary fault in the central nervous system is beyond our reach, and to hope for a perfect functional result, except in the mildest cases, is useless. In this connexion it is interesting to note that the diplegias and monoplegias have a better prognosis than the hemiplegias, for in the former rigidity tends to be the outstanding feature; in the latter paralysis predominates. None the less, provided the mentality of the patient is not so poor as to prevent the possibility of training and re-education, which must invariably follow operation, one seldom meets with a case that is not capable of deriving considerable improvement from surgical treatment carefully planned and combined with the sequel of adequate after-treatment.

Stoffel's operation aims at the partial division of the motor nerve supply to the strongly overacting muscles which have produced deformity by overcoming and stretching their more weakly acting antagonists. The common deformities are: in the lower limb, adduction of the thighs, flexion of the knees and *talipes equinus*; in the upper limb, flexion of the elbow, pronation of the forearm, flexion of the wrist and fingers and flexion and adduction of the thumb. Therefore, there is performed a partial resection of the obturator, sciatic, posterior tibial and median nerves, and this is done either in the course of the trunk of the nerve or of the individual branches to the muscles. Whether the resection be performed in the trunk of the nerve or the individual branches the disadvantages are obvious. The possibilities of nerve regeneration following partial resection have been amply shown by our experience of gunshot wounds of the nerves gained in this war, and every surgeon has seen cases—cases, too, in which the diagnosis has been confirmed by operation—in which a very considerable partial resection of a motor nerve by a bullet wound has been followed by complete regeneration, in spite of the added disadvantages of increased trauma and accompanying sepsis, which are absent when the surgeon's knife is the resecting agent. Furthermore, Nutt, at the Department of Experimental Surgery of the New York University, has performed a series of researches in which he brought muscles affected by a total lower motor neurone paralysis into intimate contact with normal healthy muscle whose nerve supply was intact. This contact was ensured by removing the intermuscular fascia between the paralysed and healthy muscles and "rawing" their adjacent surfaces. He found that motor nerves from the healthy muscle grew into the paralysed one, definite end-plates were formed and several cases showed a definite return of voluntary power. This experiment is analogous to the condition existing in a muscle affected by Stoffel's operation, and we must realize the possibility, nay, the probability, of the muscle fibres whose nerve supply has been cut off by the operation, being re-innervated in this manner, thus producing a return of the original condition. These considerations, therefore, lead us to expect that in many cases the benefit produced by the operation will be only temporary, and this is, as a matter of fact, what happens in practice.

With regard to the smaller motor nerve branches, there is a very real anatomical difficulty in only resecting portion of their motor supply, and it is an easy matter by total division to produce a complete flaccid paralysis in place of the previously existing spastic paralysis. We shall receive scant thanks from our patients, if we totally divide the nerve supply to the gastrocnemius and soleus, and thus substitute for the *talipes equinus* the much more serious deformity of *talipes calcaneus*. The advocates of Stoffel's operation speak as though the determination of the amount of resection required were possible by a simple arithmetical calculation. What justification is there for assuming that, if we divide half the motor nerve fibres to a muscle, we shall reduce its power by half? We need further investigations by the physiologists before we can make accurate calculations on this point. The operation is fundamentally unsound, both from a scientific and an anatomical standpoint. I have yet to see a single patient on whom this operation has been performed with a permanent, satisfactory result. This observation includes cases seen both here and abroad. I have cer-

tainly seen cases of cerebral diplegia in which I was told the adductor and flexor spasms had been much lessened. None the less, these patients were still unable to stand unassisted, and when helped to walk still displayed the typical "scissor leg" gait. It affords meagre comfort to the patient to be told that the flexion deformity of his knees has been reduced from 90° to 40°, if he is still unable to assume the erect posture. In actual practice this operation usually results in under-correction of the anatomical deformity, without any functional improvement, nor can we hope for a progressive improvement. On the other hand, we must look for a retrogression. Some motor fibres will be inevitably injured at the time of operation, in addition to those that are actually divided of intent by the surgeon, so that the amount of the flaccid paralysis produced will at first be at a maximum, and will be lessened as these traumatized fibres regain their conductivity. The result is that, after a lapse of a few months, the spasticity again becomes more evident.

Though Stoffel's operation must therefore be of little use, other surgical procedures are capable of effecting much for these cases. These are two in number: myomectomy and tendon transplantation. Myomectomy has particular application to the group of cases where the disability is confined mainly to spasm of the adductors, in which cases, by open incision, portion of the adductors is exsected and the limbs are afterwards maintained for a considerable period in a position of abduction. At the same time, opportunity is taken to divide any contracted bands of fascia which interfere with overcorrection, and it cannot be too strongly emphasized that this general contraction of the soft tissues plays a very large part in the perpetuation of the deformity when once established and must be thoroughly dealt with. In the hands of Sir Robert Jones marked success has attended this operation and excellent functional results are obtainable, provided that careful after-treatment be persisted in. In addition, tenotomy of the *tendo Achilles* or other structures is frequently needed, the requirements varying in the individual cases.

In the upper limb the most logical scientific and satisfactory treatment is tendon transplantation. Our object is to correct the deformity and to restore the balance of power between the flexors and the extensors, the pronators and the supinators. We have a sound practical knowledge of the relative strength of the individual muscles and in each case we can accurately forecast the amount or type of tendon transplantation required, varying it according to the indications present. It will frequently suffice to overcome the flexion contraction at the wrist if we transplant the *flexor carpi ulnaris* and *flexor carpi radialis* to the bases of the second and fifth metacarpals respectively. It may be necessary, in addition, to lengthen some of the flexors in a few cases. Over-pronation is susceptible of correction by turning the *pronator radii teres* into a supinator by detaching its tendon of insertion, passing it from before backwards through the interosseous membrane, winding it round the outer surface of the shaft of the radius and re-implanting it into the anterior surface of the bone. Resistant cases will require, in addition, longitudinal section of the interosseous membrane.

Surely these procedures, based on definite anatomical and physiological knowledge, whose exact details can be calculated with considerable accuracy, are more likely to be productive of good results than the inexact methods of Stoffel's operation, where the effect of the operation must always be more or less a matter of speculation.

Yours, etc.,

LENNOX G. TEECE.

173 Macquarie Street, Sydney,
December 18, 1918.

[We publish this letter, in spite of its great length, because of the importance of the subject with which its author deals. Correspondents are urged to express their views as concisely as possible, as it is rarely possible to allot as much space as is occupied by Dr. Teece's letter to any one correspondent. —Ed.]

ROYAL PRINCE ALFRED HOSPITAL APPEAL.

Sir,—The Royal Prince Alfred Hospital is appealing to the public for £40,000 for its Jubilee Fund, designed to set the Hospital on a sound financial footing and to enable it to add to its equipment necessary items to make it even more efficient to deal with its patients.

A hospital is to the great majority of the medical profession an invaluable adjunct in their every-day work, but does not infringe on the work of medical men, as every precaution is taken by inquiry, both from the patient and outside sources, to ensure that the Hospital shall not treat patients who can afford attendance in private.

This assistance to the medical profession has been going on for many years, and now the Hospital makes its appeal to the profession for assistance in augmenting its Jubilee Fund and enabling it to become of greater assistance than ever.

As the latest instance of what the Hospital is doing, I may quote the influenza epidemic:—

(1) Up to January 31 vaccine worth £1,000 (at the rate charged by Commonwealth authorities) was distributed free to general practitioners.
(2) Since that date 6,000 first doses (or 3,000 second doses) have been sent out free each day to medical practitioners, representing a value of £200 per day at Commonwealth rates.
(3) This necessitated a large amount of voluntary overtime work by the staff at the Hospital, professional and lay.

In distributing this vaccine it was intimated that there would be no charge, but that, as the "expense of preparing and putting up is considerable, it is hoped that those receiving it will make a suitable donation to the Hospital." The response has hitherto been disappointingly small, but we confidently anticipate that, after this reminder, the medical men of the community will show their appreciation of the Hospital in appropriate fashion.

Yours, etc.,

ROBT. McC. ANDERSON,
Chairman, Prince Alfred Hospital Jubilee Fund.

Sydney, February 5, 1919.

MASKS AS PREVENTIVE MEASURES AGAINST INFLUENZA.

Sir,—Now that the very latest novelty has arrived—the masking craze—and is enforced by law, I think it is about time some protest was made. I'm one of the many who is certainly opposed to be included in the joke. I cannot conceive that anyone with even an elementary training in bacteriology can think that the present mask is anything but a dangerous nuisance. Just imagine the leading European bacteriologists advocating a mask "for the prevention of influenza"! and even then a couple of layers of gauze (in many cases over a dirty face and septic mouth), which in a day or two becomes the happy hunting ground for all varieties of bacteria. During the last two days I've seen a number of cases of "sore throat," simply due to congestion and irritation of the nasal and bronchial passages by the repeated breathing of vitiated air, and this in itself shows the dangerous action of the mask, and certainly lays the person open to all forms of infection with no compensatory benefit.

Yours, etc.,

A. REGINALD McLEOD.

197 Elizabeth Street, Sydney,
February 6, 1919.

CREMATION.

Sir,—I am glad to see that a definite attempt to put cremation on a practical basis in New South Wales is now being made. I trust it will meet with success. Cremation is the only rational and scientific method of disposal of the dead. It should be universally adopted on the battlefields. The virulent influenza epidemic would doubtless have been prevented had this system been adopted during the recent great war.

Adelaide has led the way in cremation. The crematorium there is a neat building, suggestive of a small village church. It is worthy of note that the first two white people cremated were the remains of Dr. Wylde and Dr. Shand. The first body was that of a Sikh.

In addition to the crematorium in Adelaide, there is one in Victoria—The Necropolis, Springfield. It is, I understand, privately owned. The fees are prohibitive, *viz.*, fifteen

guineas. The remains of the late Dr. Charles Todd, of Adelaide, who died suddenly in Melbourne, were cremated there.

There is also a crematorium in connexion with the quarantine area at Fremantle, Western Australia. This, I am informed, can be used by the general public on application to the proper authority. This suggests that there should be a crematorium at every quarantine station, and that the bodies of all patients dying in a quarantine area should be cremated.

I might mention that my own belief in cremation is so definite that I have left instructions for my remains to be cremated when my life is ended.

Yours, etc.,

LEONARD W. BICKLE, F.R.C.S. (Edin.).

"Ormiston," Kirribilli, North Sydney,
February 10, 1919.

The death of Dr. William Alexander Reid, of Sale, Victoria, and of Dr. Samuel Grenville Skewes, of Wood's Point, Melbourne, has been announced.

Medical Appointments.

The Honourable H. M. Doyle, L.R.C.P., etc., who recently resigned, has been re-appointed a Government representative on the Board of Directors of the Newcastle Hospital.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," page xvii.

Royal Australian Naval Service: Ten Commissions as Surgeons.

Camooweal Cottage Hospital, Queensland: Medical Officer and Dispenser.

Charters Towers Hospital, Queensland: Resident Medical Superintendent.

Medical Appointments.

IMPORTANT NOTICE.

Medical practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429 Strand, London, W.C.

Branch.	APPOINTMENTS.
VICTORIA. (Hon. Sec., Medical Society Hall, East Melbourne.)	All Friendly Society Lodges, Institutes, Medical Dispensaries and other Contract Practice. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association.
QUEENSLAND. (Hon. Sec., B.M.A. Building, Adelaide Street, Brisbane.)	Australian Natives' Association. Brisbane United Friendly Society Institute. Cloncurry Hospital.
TASMANIA. (Hon. Sec., Macquarie Street, Hobart.)	Medical Officers in all State-aided Hospitals in Tasmania.
SOUTH AUSTRALIA. (Hon. Sec., 3 North Terrace, Adelaide.	Contract Practice Appointments at Renmark. Contract Practice Appointments in South Australia.
WESTERN AUSTRALIA. (Hon. Sec., Health Department, Perth.)	All Contract Practice Appointments in Western Australia.
NEW SOUTH WALES. (Hon. Sec., 30-34 Elizabeth Street, Sydney.)	Australian Natives' Association. Balmain United Friendly Societies' Dispensary. Canterbury United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Friendly Society Lodges at Lithgow. Friendly Society Lodges at Parramatta, Auburn and Lidcombe. Leichhardt and Petersham Dispensary. Manchester Unity Oddfellows' Medical Institute, Elizabeth Street, Sydney. Marrickville United Friendly Societies' Dispensary. New South Wales Ambulance and Transport Brigade. Newcastle Collieries—Killingworth, Seaham Nos. 1 and 2, West Wallsend. North Sydney United Friendly Societies. People's Prudential Benefit Society. Phœnix Mutual Provident Society.
NEW ZEALAND: WELLINGTON DIVISION. (Hon. Sec., Wellington.)	Friendly Society Lodges, Wellington, New Zealand.

Diary for the Month.

Feb. 18.—Tas. Branch, B.M.A., Council.
Feb. 18.—N.S.W. Branch, B.M.A., Executive and Finance Committee.
Feb. 25.—N.S.W. Branch, B.M.A., Medical Politics Committee; Organization and Science Committee.
Feb. 26.—Vic. Branch, B.M.A., Council.
Feb. 27.—S.A. Branch, B.M.A.
Feb. 28.—Queensland Branch, B.M.A., Council.
Mar. 4.—Tas. Branch, B.M.A., Council.
Mar. 5.—Vic Branch, B.M.A.
Mar. 7.—Q. Branch, B.M.A.
Mar. 11.—N.S.W. Branch, B.M.A., Ethics Committee.
Mar. 13.—Vic. Branch, B.M.A., Council.
Mar. 13.—N.S.W. Branch, B.M.A., last day for nomination of candidates for election to the Council.
Mar. 14.—S.A. Branch, B.M.A,, Council.
Mar. 14.—Q. Branch, B.M.A., Council.

EDITORIAL NOTICES.

Manuscripts forwarded to the office of this journal cannot under any circumstances be returned.

Original articles forwarded for publication are understood to be offered to *The Medical Journal of Australia* alone, unless the contrary be stated.

All communications should be addressed to "The Editor," *The Medical Journal of Australia*, B.M.A. Building, 30-34 Elizabeth Street, Sydney, New South Wales.

The Honorary Librarian of the New South Wales Branch of the British Medical Association notes that the following numbers of *Surgery, Gynecology and Obstetrics* are missing from the library files:—

1915: August, October and December.
1916: February, April and November.
1917: March.

Members who have borrowed these journals, are requested to return them as soon as possible, to enable the completed volumes to be bound.